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RESEARCH MEMORANDUM

MEDICAL MANPOWER SHORTAGES AND THE RETENTION OF NAVY PHYSICIANS

Laurie J. May
Amy E. Graham
Michelle A. Dolfini

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1. Enclosure (1) is forwarded as a matter of possible interest.
2. Navy medicine is unable to meet the demand for services. Navy hospitals could handle more cases but there is a significant manpower shortage. One possible contributor to Navy medicine's manpower problem is the low continuation rates of Navy physicians. This research memorandum examines the retention of Navy physicians in the aggregate, by career phase, and by specialty.

Lewis R. Cabe
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Director
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MEDICAL MANPOWER SHORTAGES AND THE RETENTION OF NAVY PHYSICIANS

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ABSTRACT

Navy medicine is unable to meet the demand for services. Navy hospitals could handle more cases but there is a significant manpower shortage. One possible contributor to Navy medicine's manpower problem is the low continuation rates of Navy physicians. This research memorandum examines the retention of Navy physicians in the aggregate, by career phase, and by specialty.

EXECUTIVE SUMMARY

INTRODUCTION

It is widely recognized that Navy medicine is unable to meet demand. Navy hospitals are being used at a fraction of their capacity because there is a manpower shortage. As a consequence, the Navy has increased its reliance on CHAMPUS to care for the caseload that cannot be seen inhouse.

Although the manpower shortage is not well understood, one possible contributor to Navy medicine's current manpower problem is the low retention rates of Navy physicians. One method of assessing the adequacy of medical corps retention is to compare the actual rate with the rate needed to maintain the inventory of physicians at the level that the medical corps needs to accomplish its mission. Unfortunately, lack of DOD-wide agreement on medical corps requirements makes this evaluation method difficult to implement. Instead, this analysis compares current retention rates with the rate needed to meet authorization levels and examines historical rates to determine whether retention has recently declined. Related analyses, found in [1, 2], focus on forecasting physician retention and evaluating the expected effect of alternative pay plans on medical corps retention.

MANPOWER SHORTAGES

There are two basic types of manpower shortage problems: an insufficient number of personnel in the aggregate and a mismatch between the jobs and the personnel skills. Aggregate personnel shortages are caused by either retention or accession problems. A mismatch between jobs and skills may be the result of retention and accession problems but also may be the result of training and assignment problems. The major manpower problems that exist in the medical corps appear to stem primarily from shortages in certain subcommunities rather than an aggregate shortage of personnel. In analyzing the manpower shortages in the medical corps, the study sponsors (OP-093 and OP-08) requested CNA to focus on the retention of physicians.

No single retention measure, taken in isolation, reveals the full extent and nature of Navy medicine's manpower problems. However, examination of a variety of retention measures reveals that Navy medicine has a growing retention problem among physicians who have recently completed their initial obligation, certain specialties, and experienced personnel in specific specialties.

DATA

In analyzing medical corps retention, two data bases were used: the Officer Master File (OMF) from FY 1973 to FY 1987 and the Bureau of Medicine Information System (BUMIS) from FY 1983 to FY 1987. (Some FY 1988 information from both data systems was supplied by

OP-13 and NAVMEDCOM, respectively.) This study used BUMIS as its main data base because BUMIS contains more detailed information and fewer missing fields than the OMF does for physicians. It only used the OMF to calculate aggregate continuation rates for physicians. All other retention analyses, such as the analyses by obligation, career phase, and specialty, used BUMIS. All of the retention measures were calculated for the actual population of physicians on board during the specified time period.

AGGREGATE CONTINUATION RATES

As shown in table I, the yearly aggregate continuation rate for medical corps officers has been relatively constant since FY 1981, averaging 88 percent.¹ The aggregate yearly continuation rate measures the percentage of medical officers on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year. Despite the stability of the aggregate rates, the medical corps was 353 physicians short of authorized strength (the billets funded by Congress) at the end of FY 1988 (based on BUMIS). The FY 1988 continuation rate was 9 percentage points below the rate needed to meet authorized strength.

Table I. Yearly continuation rates for active duty medical corps officers from FY 1981 to FY 1988^a

Fiscal year	Continuation rate ^b
1981	86 (3,478)
1982	88 (3,566)
1983	90 (3,602)
1984	88 (3,834)
1985	88 (3,974)
1986	89 (3,975)
1987	87 (3,959)
1988	88 (3,883)

SOURCE: Officer Master File.

NOTE: Population size is in parentheses.

- a. Individuals for whom commission type was missing were dropped from the population. For each year, this was never more than 17 people.
- b. Calculated as the percentage of medical corps officers on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year.

1. Analysis of the retention rates among unobligated physicians (physicians who are not bound to stay in the Navy by an initial contract or training obligation) reveals the rates are lower, but the pattern over time is similar to the overall continuation-rate pattern.

The aggregate continuation rate measures medical corps continuation as a whole and gives no insight into the distribution of skills and experience within the medical corps. Therefore, although the aggregate continuation rate may not show a deterioration in retention, retention problems can still exist in specific specialties and experience levels.

END OF INITIAL OBLIGATION

Anecdotal evidence suggests that the end of initial obligation is a key retention decision point. In general terms, the end of the initial obligation is a physician's first opportunity to leave the Navy. For general medical officers (GMOs) with no residency training, the initial obligation is the contract obligation. For specialists, the initial obligation includes the contract obligation and any obligation incurred for residency training. If an individual does consecutive residencies (defined as starting a second residency within two years of completing the first), initial obligation is defined to include any obligation incurred for the second residency. Because virtually all individuals completing an initial obligation are direct accessions or physicians who entered under the Armed Forces Health Professional Scholarship Program (AFHPSP), only individuals from these accession sources are analyzed.

The end of initial obligation appears to be the point at which physicians make the decision to become a careerist or leave the Navy. Therefore, changes in the attractiveness of practicing in the Navy relative to the civilian sector should significantly affect retention rates at the end of initial obligation. Because only about 375 physicians complete an initial obligation during a year, even a large change in the retention rate at the end of initial obligation may not have an immediate discernable effect on aggregate retention rates. However, lower retention at the end of initial obligation will result over time in a shortage of experienced specialists. In addition, declining initial-obligation retention rates may portend a growing general retention problem.

Historically, more than half of the Navy physicians leave immediately after completing their initial obligations. Furthermore, the retention rate for fully trained specialists at the end of initial obligation dropped dramatically (10 percentage points in FY 1987). Table II gives the retention rate at the end of initial obligation for fully trained specialists and GMOs. The retention rate for fully trained specialists dropped from 44 to 34 percent between FY 1986 and FY 1987. The retention rate for GMOs at the end of initial obligation also has been declining since FY 1984, falling from 56 percent to 33 percent in FY 1987.

Table II. Retention rates of Navy medical corps officers at end of initial obligation^a

Status	FY 1984	FY 1985	FY 1986	FY 1987	Average
After residency training					
Specialists	47 (168)	45 (257)	44 (264)	34 (238)	43
Specialists with GMO status ^b	29 (7) ^c	58 (26) ^c	63 (16) ^c	27 (15) ^c	44
GMOs	56 (41)	51 (117)	38 (81)	33 (98)	45
All (specialists and GMOs)	48 (216)	48 (400)	44 (361)	33 (351)	43

NOTE: Population size is in parentheses.

- a. Sample is limited to the population of direct accessions and scholarship students. For individuals who do a residency, initial obligation is defined as the obligation they have at the end of their residency training. If an individual does consecutive residencies (defined as starting a second residency within two years of completing the first residency), initial obligation is defined as the obligation they have at the end of the second residency. Basically, consecutive residencies are treated as continuous training. Individuals who have not done a residency (GMOs) are treated separately. For GMOs, initial obligation is defined as the obligation they have when they entered the Navy.
- b. Some individuals who have at least some residency training are coded as GMOs. These individuals have either lost their specialty privileges, never had their codes updated, or failed to complete the residency training program.
- c. Retention rates may be volatile due to small population size.

SPECIALTY CONTINUATION RATES

In addition to low retention at the end of initial obligation, the continuation rates for some specialties are low, falling below 80 percent. In evaluating specialty rates, it should be noted that, for small specialties, particularly those with populations under 20 physicians, the behavior of 1 doctor has a major effect on the continuation rate. Table III shows the historical continuation rates for all (obligated and unobligated) fully trained specialists from FY 1984 to FY 1988.¹ Because the classification of physicians in executive medicine has changed over time, the subspecialty inventories need to be adjusted to create consistently defined subspecialty categories. In FY 1986, physicians in executive medicine (administration), who previously were classified in their own separate subspecialty, were folded into the clinical subspecialty categories. To create a consistent series over time, individuals in executive medicine are taken out of the specialty inventories in calculating the continuation rates in table III.

1. The retention rates for unobligated specialists in the Navy are about 10 percentage points below the overall continuation rate, but reveal the same general patterns over time as the continuation rates for all specialists.

Table III. Yearly continuation rates for fully trained clinical specialists^a

Specialty	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Average rate
Aerospace	96	(23) ^b	100	(17) ^b	83	(18) ^b
Anesthesiology	74	(88)	74	(84)	83	(115)
Dermatology	81	(36)	91	(35)	87	(39)
Emergency	83	(12) ^b	70	(10) ^b	81	(21) ^b
Family practice	80	(235)	77	(190)	82	(182)
General surgery	77	(118)	89	(114)	71	(136)
Internal—general	85	(151)	80	(134)	86	(122)
Internal—cardiology	79	(34)	81	(32)	84	(32)
Internal—other	82	(121)	86	(104)	78	(107)
Neurology	83	(24) ^b	86	(22) ^b	80	(25) ^b
Neurosurgery	42	(12) ^b	78	(9) ^b	88	(8) ^b
OB/GYN	79	(129)	71	(119)	83	(110)
Ophthalmology	84	(55)	87	(54)	78	(54)
Orthopedics	81	(69)	82	(77)	82	(84)
Otolaryngology	69	(45)	78	(41)	80	(44)
Pathology	88	(86)	88	(81)	77	(77)
Pediatrics	86	(209)	87	(184)	87	(175)
Plastic surgery	71	7) ^b	100	(9) ^b	75	(8) ^b
Preventive medicine	85	(27)	82	(22) ^b	83	(24) ^b
Psychiatry	83	(102)	85	(93)	85	(94)
Radiology	80	(104)	73	(110)	80	(107)
Thoracic surgery	70	(10) ^b	83	(12) ^b	75	(12) ^b
Urology	69	(35)	88	(34)	82	(39)
Other	94	(16) ^b	87	(15) ^b	83	(18) ^b
All fully trained	81	(1,748)	82	(1,602)	82	(1,651)
					81	(1,588)
					81	(1,594)

NOTE: Population size is in parentheses.

a. Calculated as the percentage of fully trained specialists on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year. Excludes those in executive medicine.
b. Continuation rates may be volatile due to small population size.

As table III shows, some specialties such as pediatrics and aerospace have historically high rates, while others such as otolaryngology and radiology have low continuation rates. However, in contrast to the somewhat systematic variation in continuation rates across specialties, the individual specialty rates over time reveal no clear trend.

Relative to authorization, many specialties have an acute manpower shortage. Given the strong recruiting effort made in FY 1988, additional fully trained specialists could have been obtained that year only by higher retention. To achieve the authorized specialty strength (which includes strength for executive medicine and excludes strength for those in training) for FY 1988, the specialty continuation rates needed to be much higher than they actually were in FY 1988. Table IV contrasts the actual FY 1988 continuation rates for specialists (including those in

executive medicine) who maintained their fully trained status with the rates needed to meet strength authorization given the training pipeline and direct accession additions. (Because some specialists undertake further training, the rates in table IV differ slightly from the overall continuation rates of specialists given in table III.) Of the 23 specialties examined, 14 would have needed continuation rates to be at least 10 percentage points higher to meet authorization. For five of these specialties, even a 100-percent continuation rate would not have fulfilled authorization. Of course, eliminating the manpower shortages in one year is not desirable because it would require a large one-year jump in the continuation rates followed by lower rates to maintain authorized levels.

Table IV. Continuation rates needed to fulfill FY 1988 authorized strength

Specialty	Percentage retained at fully trained status		Percentage point difference
	Actual	Needed to meet FY 1988 authorization	
Aerospace	86	135 ^a	49 ^a
Anesthesiology	79	94	15
Dermatology	80	68	-12
Emergency	89	96	7
Family practice	79	95	16
General surgery	84	107 ^a	23 ^a
Internal—general	73	45	-28
Internal—cardiology	72	90	18
Internal—other	83	71	-12
Neurology	76	64	-12
Neurosurgery	91	109 ^a	18 ^a
OB/GYN	73	95	22
Ophthalmology	76	55	-21
Orthopedics	78	89	11
Otolaryngology	77	94	17
Pathology	78	91	13
Pediatrics	86	66	-20
Plastic surgery	77	54	-23
Preventive medicine	81	92	11
Psychiatry	86	108 ^a	22 ^a
Radiology	71	97	48
Thoracic surgery	60	150 ^a	90 ^a
Urology	66	74	8
Other	94	44	-50
All fully trained	79	83	4

a. A continuation rate over 100 percent, which is impossible, would be needed to fulfill authorization.

Between FY 1983 and FY 1987, the specialist turnover rate was more than 50 percent. The high turnover of specialists can cause management continuity problems and result in shortages of experienced personnel. Table V gives the FY 1983 to FY 1987 cumulative continuation rates of fully trained specialists (both obligated and unobligated), which is measured as the percentage who were on board at the end of FY 1983 and who were still on active duty at the end of FY 1987. Of the 23 specialties analyzed, 19 had four-year cumulative continuation rates of 50 percent or below. Neurosurgeons had the lowest cumulative continuation rate, with only 17 percent of those on board at the end of FY 1983 remaining on active duty four years later.

Table V. Cumulative continuation rate of fully trained clinical specialists from FY 1983 to FY 1987^a

Specialty	Cumulative continuation rate	
Aerospace	74	(23)
Anesthesiology	28	(88)
Dermatology	44	(36)
Emergency	50	(12)
Family practice	41	(235)
General surgery	37	(118)
Internal—general	50	(151)
Internal—cardiology	38	(34)
Internal—other	45	(121)
Neurology	42	(24)
Neurosurgery	17	(12)
OB/GYN	33	(129)
Ophthalmology	45	(55)
Orthopedics	35	(69)
Otolaryngology	38	(45)
Pathology	49	(86)
Pediatrics	58	(209)
Plastic surgery	57	(7)
Preventive medicine	56	(27)
Psychiatry	50	(102)
Radiology	32	(104)
Thoracic surgery	30	(10)
Urology	37	(35)
Other	50	(16)
All fully trained	43	(1,748)

NOTE: Population size is in parentheses.

a. Calculated as the percentage of fully trained specialists on active duty at the end of FY 1983 who were on active duty at the end of FY 1987.

EXPERIENCE LEVEL

Compounding many of the problems associated with high turnover is the fact that many specialties have suffered a dilution of experience during the last few years. Given the structure of Navy medicine and the reliance on inhouse residency training, having qualified experienced personnel to fill the graduate medical education teaching billets is crucial for ensuring the future supply of Navy physicians. Table VI gives the percentage of fully trained specialists with five or less years since completion of initial residency training. To be consistent with the FY 1983 categorizations, the FY 1987 data are adjusted to exclude individuals in executive medicine. Of the 23 specialties analyzed, 17 have experienced an increase in the percentage of newly trained physicians in the specialty since FY 1983. However, it should be noted that, in specialties with significant growth, a higher percentage of newly trained physicians does not necessarily mean that the number of experienced personnel declined.

CONCLUSION

The analysis of specialty retention reveals that the degree and nature of the manpower shortage problem varies among the specialties and over career phases. No single retention measure, taken in isolation, gives a complete picture of Navy medicine's manpower problems. However, the evaluation of several retention measures together reveals that certain specialties consistently have low retention rates, especially relative to the rates needed to meet authorized strength. In addition, the retention rate at the end of initial obligation, which has historically been low, declined dramatically between FY 1986 and FY 1987, possibly reflecting a worsening retention problem in the future.

Table VI. Percentage of fully trained clinical specialists with one to five years of experience^a

Specialty ^b	FY 1983	FY 1987
Aerospace	9 (22)	38 (13)
Anesthesiology	62 (86)	81 (110)
Dermatology	50 (34)	65 (37)
Emergency	75 (12)	88 (24)
Family practice	74 (199)	78 (179)
General surgery	40 (114)	54 (108)
Internal—general	58 (146)	67 (141)
Internal—cardiology	41 (34)	50 (26)
Internal—other	36 (121)	35 (91)
Neurology	48 (24)	44 (25)
Neurosurgery	67 (12)	64 (11)
OB/GYN	53 (128)	64 (105)
Ophthalmology	58 (55)	53 (49)
Orthopedics	55 (69)	78 (93)
Otolaryngology	51 (43)	60 (42)
Pathology	54 (85)	47 (73)
Pediatrics	45 (206)	47 (172)
Plastic surgery	43 (7)	46 (13)
Preventive	38 (26)	52 (25)
Psychiatry	39 (101)	40 (83)
Radiology	56 (102)	55 (91)
Thoracic surgery	30 (10)	40 (10)
Urology	62 (34)	63 (35)
Other	19 (16)	38 (16)
Total	52 (1,686)	59 (1,572)
Number missing	62	22

NOTE: Population size is in parentheses. Because some records are missing the residency completion date, the specialty counts differ from those in tables III and V.

- a. Experience as a physician is defined as number of years since completion of first residency.
- b. Excludes those in executive medicine.

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INTRODUCTION

It is widely recognized that Navy medicine is unable to meet demand. Navy hospitals are being used at a fraction of their capacity because there is a manpower shortage. As a consequence, the Navy has increased its reliance on CHAMPUS to care for the caseload that cannot be seen inhouse.

Although the manpower shortage is not well understood, one possible contributor to Navy medicine's current manpower problem is the low retention rates of Navy physicians. This research memorandum measures the retention rate of Navy physicians by career phase and specialty. Recent historical retention rate patterns are examined to determine whether there has been a decline in physician retention during the past few years.

MANPOWER SHORTAGES

There are two basic types of manpower shortage problems: an insufficient number of personnel in the aggregate and a mismatch between the jobs and the personnel skills. Often both types of personnel shortages exist at the same time and result from the same underlying problems. Aggregate personnel shortages are caused by either retention or accession problems. A mismatch between jobs and skills may be the result of retention and accession problems but also can result from training and assignment problems. The major manpower problems that currently exist in the medical corps appear to stem primarily from shortages in certain subcommunities rather than an aggregate shortage of personnel. The study sponsors (OP-093 and OP-08) asked CNA to focus on retention of physicians in analyzing the current shortage problem.

One method of assessing the adequacy of medical corps retention is to compare the actual rate with the rate needed to maintain the inventory of physicians at the level that the medical corps needs to accomplish its mission. Unfortunately, lack of DOD-wide agreement on medical corps requirements makes this method of evaluating retention levels difficult to implement. Instead, this analysis compares current retention rates with the rate needed to meet authorization levels and examines historical rates to determine whether retention has recently declined. Related analyses, found in [1, 2], focus on forecasting physician retention and evaluating the expected effect of alternative pay plans on medical corps retention.

Aggregate manpower shortages are generally easier to identify than specific shortages of certain types of personnel. No single retention measure, taken in isolation, reveals the full extent and nature of Navy medicine's manpower problems. However, examination of a variety of retention measures reveals that Navy medicine has a growing retention problem among physicians who have recently completed their initial obligation, certain specialties, and experienced personnel in specific specialties.

DATA

There are two main data bases that contain information on Navy physicians: the Officer Master File (OMF) and the Bureau of Medicine Information System (BUMIS). CNA's OMF data base spans 15 years from FY 1973 to FY 1987. In contrast, the BUMIS data base used by CNA only covers the period from FY 1983 to FY 1987 because prior to FY 1983 the quality of BUMIS data is poor. (Some FY 1988 information from OMF and BUMIS was supplied by OP-13 and NAVMEDCOM, respectively.) The OMF is the data system used to report end-strength figures to Congress and thus is considered the official data base for Navy officers. Unfortunately, for the physician community, this data base does not contain key information on training, obligation, and accession source needed to analyze retention over career phases. In addition, the OMF is not useful for analyzing retention among specialties because specialty information is missing on many records. In contrast, BUMIS contains detailed information on training, obligation, accession source, and subspecialties. Appendix A compares the two systems and details the major differences between the data bases. Because of the data quality differences between OMF and BUMIS, the OMF was used only to calculate aggregate continuation rates for physicians. All other retention analyses, such as the analysis by obligation, career phase, and specialty, used BUMIS. All of the retention measures were calculated for the actual population of physicians who were on board during the specified time period.

AGGREGATE CONTINUATION RATES

The yearly aggregate continuation rate for active duty medical corps officers has been relatively constant since FY 1980. The aggregate yearly continuation rate measures the percentage of medical officers on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year. For example, the FY 1985 continuation rate (C_{85}) is measured as,

$$C_{85} = \frac{\text{number on active duty at the beginning of FY 1985 who remained on active duty as of the end of FY 1985}}{\text{number on active duty at the beginning of FY 1985}}.$$

Table 1 gives the yearly aggregate continuation rate for medical corps officers since FY 1974. Although the aggregate continuation rate rose during the 1970s, the rate has been very stable since FY 1980, averaging 88 percent. The continuation rate prior to FY 1980 is not relevant to the current situation in the medical corps because many institutional changes were made during the 1970s that directly affected obligations and retention. Changes in the continuation rate during the 1970s reflect the transition from the draft to a volunteer force as well as the institution of new accession programs such as the Armed Forces Health Professions Scholarship Program (AFHPSP).

Table 1. Yearly continuation rates for active duty medical corps officers from FY 1974 to FY 1988^a

Fiscal year	Continuation rate ^b
1974	62 (2,725)
1975	73 (3,472)
1976	66 (3,442)
1977	79 (3,625)
1978	83 (3,525)
1979	85 (3,494)
1980	85 (3,573)
1981	86 (3,478)
1982	88 (3,566)
1983	90 (3,602)
1984	88 (3,834)
1985	88 (3,974)
1986	89 (3,975)
1987	87 (3,959)
1988	88 (3,883)

SOURCE: Officer Master File.

NOTE: Population size is in parentheses.

- a. Individuals for whom commission type was missing were dropped from the population. For each year, this was never more than 17 people.
- b. Calculated as the percentage of medical corps officers on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year.

Despite the stability of the aggregate continuation rates, the medical corps was significantly short of authorized strength at the end of FY 1988. Medical corps billet authorizations to some extent reflect short-term inventory goals and can help illuminate the magnitude of shortages. In practice, authorized billets do not reflect medical corps requirements, which are in dispute and thus do not represent the true medical corps manpower needs. Instead, authorized billets are the billets funded by Congress and are generally a reflection of current inventory levels and short-term manpower goals that are perceived to be achievable.

As of the end of FY 1988, the Navy officer community as a whole is estimated to be 404 persons under authorized strength (manned at 99.2 percent of authorization). Although the total Navy officer authorization shortfall is the sum of all the shortfalls and overages of the various subcommunities, most of the aggregate shortage is from the medical community. In relative terms, the medical corps shortfall is very large, with the community having an estimated shortfall

of 353 physicians¹ (manned at 92 percent of authorization at the end of FY 1988). To fill the 4,282 billets authorized for FY 1988 after accounting for new gains, a 97-percent continuation rate was needed. The actual rate for FY 1988 was 88 percent.

The aggregate continuation rate does not discern between voluntary and involuntary continuation. Based on their accession source and training track, physicians can incur long service obligations. In recent years, up to 61 percent of the medical corps has been under obligation and thus not able to leave the Navy during that year. By definition, if no one is forced out while under obligation, the continuation rate has to be at least as high as the percentage under obligation. For FY 1984 through FY 1987, table 2 gives the percentage of the medical corps who were under obligation (for initial contract, training, or augmentation).²

Table 2. Percentage of the medical corps under obligation^a

FY 1984	FY 1985	FY 1986	FY 1987
61 (3,819)	60 (3,914)	60 (3,924)	60 (3,926)

NOTE: Population size is in parentheses.

a. Excludes individuals who have missing data on obligation status.

Continuation rates measure the percentage of the entire force that is retained, ignoring obligation status. This measure of retention is useful for force management. In contrast, retention rates measure the percentage of unobligated physicians that are retained and are useful in detecting behavioral changes over time. Unobligated individuals are eligible to leave the Navy during the time period being examined. In practice, because very few people are allowed to leave while under obligation, retention rates are lower than continuation rates. If the percentage and specialty mix of obligated physicians remains relatively constant over time, these two measures, although differing in magnitude, will reveal the same retention trends and patterns. For FY 1984 through FY 1987, the percentage of obligated physicians was relatively constant.

1. As of the end of August 1988, the Navy was 404 under strength (source: NMPC-454). Based on MEDCOM-5125's medical corps authorization figure for FY 1988 of 4,282 and the FY 1988 BUMIS medical corps endstrength number of 3,929, it is estimated that the medical corps was 353 physicians under strength as of the end of FY 1988 (sources: MEDCOM-512 and FY 1989 Incentive Special Pay Plan prepared by MEDCOM-5125, 19 May 1988).

2. The percentage of physicians who are under obligation during an entire year and thus not eligible to leave during that period is smaller than the percentage of physicians who are under obligation on any given day. The percentage of the medical corps that was under obligation on the last day of the fiscal year was 72 in 1983 and 1984, 71 in 1985 and 1986, and 76 in 1987.

and thus the continuation rates and retention rates generally reveal the same picture of medical corps retention. In analyzing medical corps retention, the study team examined both retention rates and continuation rates. For the time period analyzed these two measures reveal highly similar pictures of Navy medical corps retention. Therefore, this research memorandum displays most of the supporting calculations for the analysis in the form of continuation rates, presenting the analogous retention rate measures in appendixes B, C, and F.

Analysis of the aggregate retention rates among unobligated physicians reveals that, although the rates are lower, the pattern over time is similar to the overall continuation-rate pattern. As shown in appendix B, the retention rate for unobligated physicians changed little between FY 1984 (when retention averaged 76 percent) and FY 1987 (when retention averaged 74 percent).

The aggregate continuation rate measures medical corps continuation as a whole and gives no insight into the distribution of skills and experience within the medical corps. Therefore, although the aggregate continuation rate may not show a retention problem, retention problems can still exist in specific specialties and among individuals with certain experience levels.

Typically, community retention in the military is analyzed by years of service to identify the key retention decision points in individuals' career paths. However, because the training paths vary widely among Navy physicians, analyzing physician retention by years of service only gives limited insight into the key retention decision points for physicians. Table 3 gives the historical continuation rates by years of service for all physicians. As expected, continuation rates are very high during the first two years of service when all physicians are under obligation. Continuation rates drop between 3 and 11 years of service, which is the period of time when physicians complete their obligation following residency training. Continuation rates are particularly low between the seventh and ninth year of service, which is when most physicians complete their obligation after residency training. After 12 years of service, continuation rates are 90 percent or higher until 20 years of service when people become eligible to retire. The continuation-rate pattern by years of service supports the conclusion that the end of obligation for residency training and 20 years of service are the two main retention decision points in a physician's career. In addition, the yearly continuation rates of individuals who stay past the completion of their training obligation are high, further reinforcing the conclusion that, at the end of initial obligation, physicians either make a long-term commitment to the Navy or leave.

In an attempt to control for the effect of varying training paths on continuation, years-of-service continuation rates are calculated by source of entry (given in appendix C). Individuals entering through the same accession program generally follow similar training paths and have similar obligations. However, even within an accession source, training paths can vary significantly. As shown in appendix C, years-of-service continuation rates by source of entry reinforce the conclusion that the end of initial obligation and 20 years of service are key retention decision points.

Table 3. Continuation rates by years of commissioned service for all physicians^a

Years of service ^b	FY 1984	FY 1985	FY 1986	FY 1987	Average rate
<1	97 (458)	98 (476)	97 (373)	97 (316)	97
2	92 (456)	93 (460)	94 (466)	98 (369)	94
3	90 (349)	87 (412)	84 (430)	88 (443)	87
4	87 (323)	88 (326)	90 (365)	82 (366)	87
5	91 (359)	90 (312)	88 (321)	87 (371)	89
6	88 (294)	87 (321)	90 (292)	91 (291)	89
7	83 (298)	86 (264)	89 (285)	87 (260)	86
8	73 (191)	79 (251)	81 (229)	79 (258)	78
9	82 (142)	83 (146)	81 (202)	78 (190)	81
10	93 (99)	88 (120)	87 (126)	82 (164)	88
11	88 (95)	91 (94)	86 (107)	86 (115)	88
12	84 (125)	90 (87)	90 (87)	95 (96)	90
13	88 (108)	88 (105)	94 (79)	94 (77)	91
14	82 (72)	93 (95)	91 (94)	95 (74)	90
15	92 (63)	97 (59)	93 (89)	94 (87)	94
16	95 (60)	98 (57)	90 (58)	95 (84)	95
17	98 (48)	93 (55)	98 (56)	98 (53)	97
18	96 (49)	94 (48)	92 (52)	95 (55)	94
19	95 (38)	91 (47)	96 (45)	98 (48)	95
20	73 (37)	69 (36)	65 (43)	60 (43)	67
21	84 (25)	74 (27)	64 (25)	68 (28)	73
> 21	75 (126)	74 (117)	77 (107)	77 (98)	76
Total	88 (3,815)	89 (3,915)	89 (3,931)	88 (3,886)	88
Number missing	32	15	23	61	

NOTE: Population size is in parentheses. Several records were missing the date of commission in a given year. Records with missing data are generally for new active duty personnel. For the records that are missing the date of commission in a given year, the first valid commissioning date found on the closest subsequent year's record is used as a substitute. There are still, however, a few cases in which an individual is incorrectly counted as inactive or has an incorrect commissioning date. This results in a few appearances of lateral entries into the time-in-service cohorts.

a. Continuation rates are calculated as the percentage of medical corps officers on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year.

b. As of the beginning of the fiscal year. For example, three years of service implies that as of 1 October: 2 < years of service \leq 3.

END OF INITIAL OBLIGATION

The aggregate continuation rates by years of service suggest that the end of initial obligation is a key retention decision point for Navy physicians. In general terms, the end of the initial obligation represents a physician's first opportunity to leave the Navy. Thus, the initial obligation marks an important milestone in the career of a Navy physician. Characterizing retention behavior at this milestone can help explain overall patterns of experience and attrition among Navy physicians. However, defining the initial obligation and identifying the end of that obligation with the available data are complicated.

Active Duty Obligations for Navy Physicians

A Navy officer incurs active duty obligations (ADOs) through participation in accession, training, and other Navy programs. The number of years required to discharge these obligations depends on many factors. Participation in some programs carries an additive obligation, while participation in others allows the obligation to be served concurrently. Physicians enter the Navy under different accession programs requiring different terms of service. Finally, some periods of active service do not count toward meeting certain ADOs. In defining the end of initial obligation for Navy physicians, the principal obligation programs affecting Navy physicians and the rules governing the discharge of these obligations must be considered.

Accession Programs

According to [3], the Navy currently uses three major accession programs to recruit physicians, the Armed Forces Health Professions Scholarship Program (AFHPSP), the School of Medicine at the Uniformed Services University of the Health Sciences (USUHS), and the direct accession program. Physicians who enter the Navy through AFHPSP and USUHS incur an obligation for medical school education funded or directly provided by the Navy. Direct accessions usually complete one or more years of graduate medical education (GME) before entering the Navy and have a contract obligation. Navy physicians may extend the obligation they incur under an accession program through augmentation or residency training in Navy-sponsored programs.

The Armed Forces Health Professions Scholarship Program

AFHPSP participants typically begin active duty upon graduation from a civilian medical school and receive a commission in the Navy reserve. The length of the obligation ranges from two to four years depending on the number of years the individual participates in the program, as described in [4], [5], and [6].

Direct Accessions

Direct accessions also enter the Navy after medical school. Most direct accessions enter the Navy as fully trained specialists. Direct accessions sign contracts in which they agree to serve for two, three, or four years. A minority of direct accessions undertake GME, which includes internship and residency training, upon entering the Navy. These individuals include accessions entering the Navy before and after internship and individuals who completed one residency before beginning active duty.

Other Accession Programs

Navy physicians have also entered through USUHS and several programs that the Navy no longer uses. Virtually no USUHS students and no individuals who entered the Navy under an old accession program have completed their initial obligation during the last five years. USUHS participants have not yet reached the end of their initial obligation,¹ while physicians who entered under older accession programs are assumed to have passed their initial obligation. Therefore, the sample of physicians at the end of initial obligation only includes direct accessions and AFHPSP participants.

Graduate Medical Education

GME affects both the length of the initial obligation and the timing of the physician's obligated service. Periods of GME (internship, residency, or fellowship) completed in Navy programs while on active duty do not count toward fulfillment of the ADO for participation in USUHS or AFHPSP or contract obligations, as noted in [4]. Internship (GME-1) does not carry an additional obligation. Residency training (GME-2) and fellowships can involve additional obligation depending on the individual's situation. Prior to April 1988, (the time period of the data analyzed) physicians entering GME with less than two years of obligation agreed to serve at least two years following the completion of the training program.²

Augmentation

A Navy physician may also lengthen his obligation through augmentation. Augmentation refers to the transfer of an officer's commission from the Reserve establishment to the regular Navy. However, because the Defense Officer Personnel Management Act (DOPMA) rules do

1. As in the case of the AFHPSP program, the obligation of USUHS accessions varies with their participation in the program. The minimum obligation is 27 months, while full participation in the program entails a 7-year obligation as described in [7]. The first class graduated from USUHS in 1979 and virtually all remain under obligation.

2. The rules governing obligation for residency training recently changed. Under the 1988 regulations, a physician accrues an obligation equal to the time spent in GME, with a minimum obligation of two years. The obligation for GME at a military facility may be served concurrently with prior ADOs. The obligation for GME at a civilian facility is additive, as discussed in [4].

not apply to medical corps officers, physicians are not required to augment to stay in the Navy. Augmentation carries an obligation of two years of active duty subsequent to the acceptance of the appointment in the regular Navy. This obligation can be served concurrently with any previous obligation and can be served while undertaking training, including GME.

DEFINING INITIAL OBLIGATION

Under the current rules, the quickest way for a physician entering the Navy after medical school to meet his training obligation is to complete an internship and serve as a general medical officer (GMO) for the length of the obligation. Some physicians do become unobligated without specializing. For GMOs, the initial obligation is simply the physician's obligation for an accession program.

Typically, physicians specialize through at least one formal residency program while still under their accession program obligation. For this study, the initial obligation for physicians who complete at least one residency is defined as the time until a physician's first opportunity to leave the Navy as a fully trained specialist. Under this definition, a specialist's initial obligation includes obligations incurred for the accession program and GME. This definition treats the decision to specialize as a professional necessity rather than an indication of a preference for military service.

A specialist may postpone the end of the initial obligation by beginning a second residency. Physicians who enter second residencies or fellowships within two years of completing their first residencies do not become unobligated until after completing the second training track. Most second residencies are in fields that are complementary to first residency training and therefore obligation incurred for a second residency begun within two years of completing a first residency is considered for this analysis to be part of the initial obligation.

An obligation for augmentation may extend or overlap the obligation for accession and training. Augmentation offers no benefits to medical corps officers who plan to leave the Navy, and officers holding a regular commission in the Navy can be held in for up to one year from the date on which they submit a resignation letter. This suggests that, unlike the decision to specialize, the decision to augment is in effect a decision to become a career officer. In this case, the retention decision probably should be evaluated when the officer augments rather than at the end of the obligation period. Unfortunately, the available data do not contain the date an officer accepts a regular commission. In practice, the effect of this limitation is small because few physicians augment. Officers coming off an obligation for augmentation are simply excluded from the sample.

Identifying the end of an initial obligation is difficult with the BUMIS data. BUMIS contains only the date on which the officer's most recent obligation ends. However, not all periods of obligation qualify as initial obligations. A physician may have passed the initial obligation and then incurred a new obligation or a physician may extend the initial obligation

through GME. Identifying initial obligations required first establishing bounds on the length of service beyond career milestones (such as residency completion) that could be considered initial obligated service. Only obligations that ended within these bounds were considered initial obligations. Appendix D provides a detailed description of the data classification procedure used to identify initial obligations.

Changes in retention behavior should appear first as changes in the retention rate at the end of initial obligation. The end of initial obligation marks the first time an individual can leave after completing training and appears to be the point at which physicians make the decision to become a careerist or leave the Navy. Therefore, changes in the attractiveness of practicing in the Navy relative to the civilian sector should first affect retention rates the end of initial obligation. Because only about 375 physicians complete their initial obligations during a year, even a large reduction in their retention rate in a given year may not have an immediate discernable effect on aggregate continuation rates. However, over time, lower retention at the end of initial obligation will result in a shortage of experienced specialists. In addition, declining initial obligation retention rates may portend a growing general retention problem.

Historically, more than half of the Navy physicians leave immediately after completing their initial obligations. In addition, the retention rate for fully trained specialists at the end of initial obligation dropped dramatically (10 percentage points in FY 1987). Table 4 gives the retention rate at the end of initial obligation for fully trained specialists and GMOs. It shows that the retention rate for fully trained specialists dropped from 44 to 34 percent between FY 1986 and FY 1987. In addition, the retention rate of GMOs at the end of initial obligation has been declining since FY 1984, falling from 56 percent to 33 percent in FY 1987.

The retention rates in table 4 reflect retention at the end of the fiscal year in which the physician completes his initial obligation (i.e., within 1 to 12 months of completing initial obligation). For example, in table 4, the FY 1985 retention rate at the end of initial obligation (R_{85}) is calculated as

$$R_{85} = \frac{\text{number who completed an initial obligation in FY 1985 and remained on active duty as of the end of FY 1985}}{\text{total number who completed an initial obligation in FY 1985}} .$$

Retention is measured at the end of the fiscal year because the BUMIS variable that records whether a physician has left active duty at the end of the fiscal year is the most accurate indicator of the decision to leave. Individuals reaching the end of an initial obligation late in the fiscal year have a shorter "observation window" in which to leave than those reaching the end of an obligation early in the fiscal year. In addition, physicians may remain in the Navy for several

months beyond the end of their initial obligation if they are bound by a pay contract.¹ Extending the observation window by measuring retention during the year after completing an initial obligation ensures that all individuals are observed having an opportunity to leave the Navy.

Table 4. Retention rates of Navy medical corps officers at end of initial obligation^a: 12-month window

Status	FY 1984	FY 1985	FY 1986	FY 1987	Average
After residency training					
Specialists	47 (168)	45 (257)	44 (264)	34 (238)	43
Specialists with GMO status ^b	29 (7) ^c	58 (26) ^c	63 (16) ^c	27 (15) ^c	44
GMOs	56 (41)	51 (117)	38 (81)	33 (98)	45
All (specialists and GMOs)	48 (216)	48 (400)	44 (361)	33 (351)	43

NOTE: Population size is in parentheses.

- a. Sample is limited to the population of direct accessions and scholarship students. For individuals who do a residency, initial obligation is defined as the obligation they have at the end of their residency training. If an individual does consecutive residencies (defined as starting a second residency within two years of completing the first residency), initial obligation is defined as the obligation they have at the end of the second residency. Basically, consecutive residencies are treated as continuous training. Individuals who have not done a residency (GMOs) are treated separately. For GMOs, initial obligation is defined as the obligation they have when they entered the Navy.
- b. Some individuals who have at least some residency training are coded as GMOs. These individuals have either lost their specialty privileges, never had their codes updated, or failed to complete the residency training program.
- c. Retention rates may be volatile due to small population size.

Retention at the end of initial obligation is much lower using a longer observation window. The retention rates in table 5 reflect retention at the end of the fiscal year following the fiscal year in which the physician reaches the end of initial obligation (i.e., within 12 to 24 months). For example, in table 5, the FY 1985 to FY 1986 retention rate at the end of initial obligation (R_{85-86}) is calculated as

$$R_{85-86} = \frac{\text{number who completed an initial obligation in FY 1985 and remained on active duty as of the end of FY 1986}}{\text{total number who completed an initial obligation in FY 1985}}$$

1. Physicians can receive two types of special pay, incentive special pay (ISP) and additional special pay (ASP), if they sign a contract agreeing to serve for an additional year. In the Navy, most ASP contracts run from July to July, while most ISP contracts coincide with the fiscal year. A physician due to end an obligation in July might accept an ISP contract requiring him to serve through the end of that fiscal year and then leave. BUMIS would show this physician as a loss the following fiscal year.

These retention rates strengthen the view that losses at the end of initial obligation are a serious drain on medical manpower.

Table 5. Retention rates of Navy medical corps officers at the end of initial obligation^a: 24-month window.

Status	Fiscal years		
	1984-85	1985-86	1986-87
After residency training			
Specialists	34 (168)	27 (257)	32 (264)
Specialists with GMO status ^b	29 (7) ^c	54 (26) ^c	44 (16) ^c
GMOs	41 (41)	42 (117)	32 (81)
All (specialists and GMOs)	35 (216)	33 (400)	33 (361)

NOTE: Population size is in parentheses.

- a. Sample is limited to the population of direct accessions and scholarship students. For individuals who do a residency, initial obligation is defined as the obligation he has at the end of their residency training. If an individual does consecutive residencies (defined as starting a second residency within two years of completing the first residency), initial obligation is defined as the obligation he has at the end of the second residency. Basically, consecutive residencies are treated as continuous training. Individuals who have not done a residency (GMOs) are treated separately. For GMOs, initial obligation is defined as the obligation they have when they entered the Navy.
- b. Some individuals who have some residency training are coded as GMOs. These individuals have either lost their specialty privileges, never had their codes updated, or failed to complete the residency training program.
- c. Retention rates may be volatile due to small population size.

TWENTY YEARS OF SERVICE

Twenty years of service mark another significant career milestone for Navy physicians. Navy officers are first eligible to retire with complete benefits at 20 years of service. As in other Navy officer communities, many physicians choose to retire at first eligibility. Table 6 shows the continuation rate at 20 years of service. As in the case of retention at the end of initial obligation, the continuation rate at 20 years of service has been declining. Between FY 1984 and FY 1987, the continuation rate at 20 years of service declined from 73 percent to 60 percent.

Table 6. Continuation rates of Navy medical corps officers at 20 years of service

FY 1984	FY 1985	FY 1986	FY 1987	Average rate
73 (37)	69 (36)	65 (43)	60 (43)	67

NOTE: Population size is in parentheses.

SPECIALTY CONTINUATION RATES

The yearly continuation rates of fully trained specialists reveal that continuation rates vary significantly among specialties. All specialty rate comparisons need to be qualified by the fact that, for the small specialties (particularly those with less than 20 physicians), the behavior of one doctor has a major effect on the continuation rate. Table 7 shows the historical continuation rates for all (obligated and unobligated) fully trained specialists from FY 1984 to FY 1988. Appendix E describes how the subspecialties are classified into general specialty categories. How individuals in executive medicine (administration) have been counted has changed multiple times between FY 1984 and FY 1988. A major definitional change occurred in FY 1986 when physicians in executive medicine, who had previously been categorized as under a separate subspecialty, were folded into their respective clinical specialties. This definitional change affects the continuation rate calculations for FY 1987 and FY 1988. As a result, two sets of continuation rates are given in table 7 for FY 1987 and FY 1988. The first set is not adjusted for the definitional change and is based on how that specialty was defined at the beginning of that year. The second set is adjusted to exclude those in executive medicine in an attempt to preserve a consistent specialty definition over the period studied. Appendix E describes the methodology used to exclude executive medicine in the FY 1987 and FY 1988 data.

As table 7 shows, the variation in continuation rates among specialties appears to be somewhat consistent over time, with specialties such as pediatrics and aerospace historically having relatively high rates and otolaryngology and radiology having low rates. In contrast to the somewhat systematic variation in continuation rates across specialties, the individual specialty continuation rates reveal no clear trend over time. Specialty continuation rates change significantly from year to year, especially for the smaller specialties. The obligation status, the experience profile, and the size of the specialty are all factors that change over time and are possible causes of the fluctuation in continuation rates. The exclusion of executive medicine physicians in FY 1987 and FY 1988, to create a consistent series over time, affects the continuation rates only slightly. Although physicians in executive medicine are senior personnel who tend to stay, they have a high retirement rate.

Table 7. Yearly continuation rates for fully trained specialists^a

Specialty	FY 1984	FY 1985	FY 1986	FY 1987	Unadjusted (includes executive medicine)		Adjusted (excludes executive medicine)	
					FY 1988	FY 1988	FY 1987	FY 1988
Aerospace	96	(23) ^b	100	(17) ^b	83	(18) ^b	93	(30)
Anesthesiology	74	(88)	74	(84)	83	(115)	72	(113)
Dermatology	81	(36)	91	(35)	87	(39)	77	(44)
Emergency	83	(12) ^b	70	(10) ^b	81	(21) ^b	92	(25) ^b
Family practice	80	(235)	77	(190)	82	(182)	82	(205)
General surgery	77	(118)	89	(114)	71	(136)	83	(121)
Internal—general	85	(151)	80	(134)	86	(122)	88	(139)
Internal—cardiology	79	(34)	8*	(32)	84	(32)	81	(31)
Internal—other	82	(121)	86	(104)	78	(107)	74	(101)
Neurology	83	(24) ^b	86	(22) ^b	80	(25) ^b	88	(25) ^b
Neurosurgery	42	(12) ^b	78	(9) ^b	88	(8) ^b	75	(8) ^b
OB/GYN	79	(129)	71	(119)	83	(110)	76	(117)
Ophthalmology	84	(55)	87	(54)	78	(54)	81	(57)
Orthopedics	81	(69)	82	(77)	82	(84)	79	(94)
Otolaryngology	69	(45)	78	(41)	80	(44)	77	(48)
Pathology	88	(86)	88	(81)	77	(77)	87	(77)
Pediatrics	86	(209)	87	(184)	87	(175)	87	(194)
Plastic surgery	71	(7) ^b	100	(9) ^b	75	(8) ^b	86	(7) ^b
Preventive medicine	85	(27)	82	(22) ^b	83	(24) ^b	94	(32)
Psychiatry	83	(102)	85	(93)	85	(94)	86	(93)
Radiology	80	(104)	73	(110)	80	(107)	77	(111)
Thoracic surgery	70	(10) ^b	83	(12) ^b	75	(12) ^b	89	(9) ^b
Urology	69	(35)	88	(34)	82	(39)	79	(42)
Other	94	(16) ^b	87	(15) ^b	83	(18) ^b	89	(18) ^b
All fully trained	91	(1,748)	82	(1,602)	82	(1,651)	82	(1,741)

NOTE: Population size is in parentheses.

a. Calculated as the percentage of fully trained specialists on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year.

b. Continuation rates may be volatile due to small population size.

Although the retention rates for unobligated specialists in the Navy are about 8 percentage points below the continuation rates for all specialists, the patterns over time are similar. Appendix F gives the retention rates for all unobligated specialists by specialty. The overall specialists retention rate shows little change between FY 1984 (when retention was 74 percent) and FY 1987 (when retention was 73 percent).

Relative to authorization, many specialties have an acute manpower shortage. The data given in table 8 show that, overall, the fully trained specialty billets (including those for executive medicine and excluding those for individuals in training) were manned at 95 percent of authorized strength. Only 7 of the 23 specialties examined were manned at or above authorization. Furthermore, 13 of the 23 specialties examined were manned at less than 90 percent of authorization. In addition, as shown in figure 1, many specialties are only able to achieve reasonable strength levels through heavy reliance on the training pipeline. In 13 of the 23 specialties examined, at least one-fifth of the ending FY 1988 inventory is comprised of new residency graduates from the training pipeline. Most specialties are below authorization levels, which are below medical requirements, and many specialties are achieving their strength levels through an influx of junior personnel.

Given the strong recruiting effort made in FY 1988, additional fully trained specialists could have been obtained that year only by higher retention. To achieve the authorized specialty strength for FY 1988, the specialty continuation rates needed to be much higher than they actually were. Table 9 gives the actual FY 1988 continuation rate for specialists (including those in executive medicine) who maintained their fully trained status. Because a few specialists who stayed in the Navy in FY 1988 lost their fully trained status by undertaking more training, the continuation rates in table 9 differ slightly from those reported in table 7. Table 9 contrasts the actual FY 1988 specialty continuation rates with the continuation rates that were needed to meet authorization, given the additions from the training pipeline and direct accessions. Only 7 of the 23 specialties examined had continuation rates that were high enough to fulfill authorization. In contrast, for five specialties, even a 100-percent continuation rate would not have fulfilled authorization. Of the 23 specialties, 14 would have needed continuation rates to be at least 10 percentage points higher than they actually were to meet authorization. Of course, eliminating the manpower shortages in one year is not desirable because it would require a large one-year jump in the continuation rates followed by lower rates to maintain authorized levels.

Between FY 1983 and FY 1987, the specialist turnover rate was greater than 50 percent. A high turnover rate can cause management continuity problems and result in shortages of experienced personnel. Table 10 gives the cumulative continuation rates of fully trained specialists (both obligated and unobligated) between FY 1983 and FY 1987. This table shows the percentage of specialists who were on board at the end of FY 1983 and who were still on active duty at the end of FY 1987. By FY 1987, almost all of the specialists who were under obligation in FY 1983 would have completed their obligation. Of the 23 specialties analyzed, 19 had four-year cumulative continuation rates of 50 percent or below. Neurosurgeons had the lowest cumulative

Table 8. Inventory of Navy specialists by source at the end of FY 1988

Specialty	Retained inventory	New gains		Total inventory	Authorization ^b	Shortage ^c
		Training pipeline ^a	Direct accessions			
Aerospace	32	3	0	35	53	18
Anesthesiology	93	27	2	122	139	17
Dermatology	32	7	1	40	35	-5
Emergency	25	12	0	37	39	2
Family practice	169	35	1	205	240	35
General surgery	96	26	13	135	161	26
Internal—general	115	39	4	158	114	-44
Internal—cardiology	21	1	0	22	27	5
Internal—other	84	12	0	96	84	-12
Neurology	19	11	1	31	28	-3
Neurosurgery	10	4	0	14	16	2
OB/GYN	81	27	2	110	134	24
Ophthalmology	42	15	1	58	46	-12
Orthopedics	77	20	1	98	109	11
Otolaryngology	37	7	1	45	52	7
Pathology	62	9	9	80	91	11
Pediatrics	169	24	5	198	158	-40
Plastic surgery	10	1	0	11	8	-3
Preventive	30	13	1	44	48	4
Psychiatry	78	11	3	92	112	20
Radiology	65	20	1	86	110	24
Thoracic surgery	6	2	1	9	18	9
Urology	25	9	2	36	39	3
Other	17	1	1	19	10	-9
No classification ^c	0	3	0	3	-	-3
Total	1,395	339	50	1,784	1,871	93

a. Includes those who completed residency training in FY 1988 and did not start additional specialty training as of the end of FY 1988. Some of these individuals are still coded as being in a training status even though they have completed their residency. These individuals are counted as gains in FY 1988.

b. Includes authorized billets for executive medicine and excludes authorized billets for fully trained specialists who are currently in training pursuing a second or third specialty.

c. These individuals are in specialties in FY 1988 that, given the coding changes of 1988, cannot be mapped into the above specialty groupings.

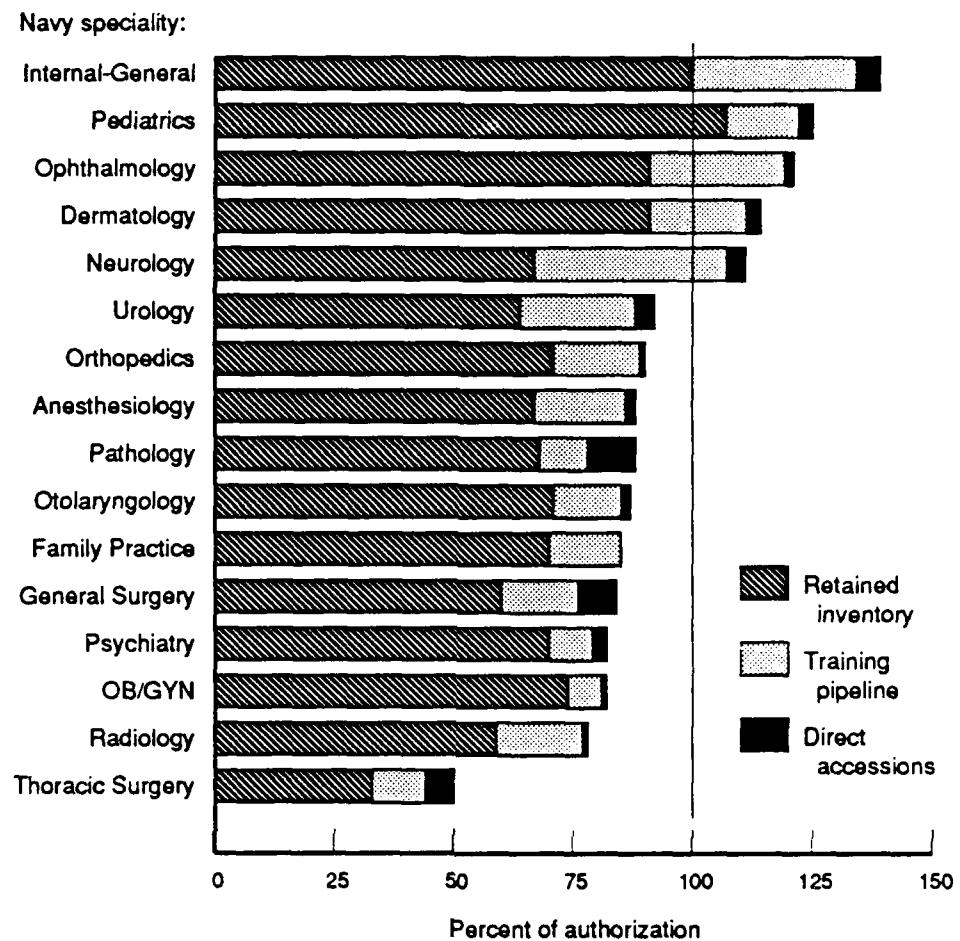


Figure 1. Inventory of selected Navy specialists at the end of FY 1988

continuation rate, with only 17 percent of those on board at the end of FY 1983 remaining on active duty four years later.

EXPERIENCE LEVEL

In addition to a generally high turnover rate, many specialties have been experiencing a dilution of experience during the last few years. Given the structure of Navy medicine and its reliance on in-house residency training, having qualified experienced personnel to fill the GME teaching billets is crucial for ensuring the future supply of Navy physicians. Table 11 gives the percentage of fully trained specialists with five or fewer years since completion of initial residency training. The inclusion of executive medical personnel in the clinical specialties after 1986 results in inconsistently defined subspecialty categories and gives the appearance that experience levels have declined by less than they actually have over the period studied. Table 11

gives the experience level measures after 1986 using both the unadjusted figures and the adjusted figures that create a consistent series by excluding those in executive medicine.

Table 9. Continuation rates needed to fulfill FY 1988 authorized strength

Specialty	Percentage retained at fully trained status		Percentage point difference
	Actual	Needed to meet FY 1988 authorization	
Aerospace	86	135 ^a	49 ^a
Anesthesiology	79	94	15
Dermatology	80	68	-12
Emergency	89	96	7
Family practice	79	95	16
General surgery	84	107 ^a	23 ^a
Internal—general	73	45	-28
Internal—cardiology	72	90	18
Internal—other	83	71	-12
Neurology	76	64	-12
Neurosurgery	91	109 ^a	18 ^a
OB/GYN	73	95	22
Ophthalmology	76	55	-21
Orthopedics	78	89	11
Otolaryngology	77	94	17
Pathology	78	91	13
Pediatrics	86	66	-20
Plastic surgery	77	54	-23
Preventive medicine	81	92	11
Psychiatry	86	108 ^a	22 ^a
Radiology	71	97	48
Thoracic surgery	60	150 ^a	90 ^a
Urology	66	74	8
Other	94	44	-50
All fully trained	79	83	4

a. A continuation rate over 100 percent, which is impossible, would be needed to fulfill authorization.

Table 10. Cumulative continuation rate of fully trained specialists from FY 1983 to FY 1987^a

Specialty	Cumulative continuation rate
Aerospace	74 (23)
Anesthesiology	28 (88)
Dermatology	44 (36)
Emergency	50 (12)
Family practice	41 (235)
General surgery	37 (118)
Internal—general	50 (151)
Internal—cardiology	38 (34)
Internal—other	45 (121)
Neurology	42 (24)
Neurosurgery	17 (12)
OB/GYN	33 (129)
Ophthalmology	45 (55)
Orthopedics	35 (69)
Otolaryngology	38 (45)
Pathology	49 (86)
Pediatrics	58 (209)
Plastic surgery	57 (7)
Preventive medicine	56 (27)
Psychiatry	50 (102)
Radiology	32 (104)
Thoracic surgery	30 (10)
Urology	37 (35)
Other	50 (16)
All fully trained	43 (1,748)

NOTE: Population size is in parentheses.

a. Calculated as the percentage of fully trained specialists on active duty at the end of FY 1983 who were on active duty at the end of FY 1987.

Table 11. Percentage of fully trained specialists with one to five years of experience^{a, b}

Specialty	FY 1983	FY 1984	FY 1985	FY 1986	Unadjusted (includes executive medicine)		Adjusted (excludes executive medicine)	
					FY 1987	FY 1988	FY 1986	FY 1987
Aerospace	9 (22)	20 (15)	29 (14)	15 (27)	24 (34)	27 (11)	38 (13)	
Anesthesiology	62 (86)	73 (84)	79 (110)	77 (111)	77 (115)	80 (107)	81 (110)	
Dermatology	50 (34)	56 (34)	62 (37)	60 (42)	60 (40)	63 (40)	65 (37)	
Emergency	75 (12)	90 (10)	79 (14)	68 (19)	81 (26)	75 (16)	88 (24)	
Family practice	74 (199)	77 (175)	80 (172)	73 (189)	72 (197)	79 (174)	78 (179)	
General surgery	40 (114)	43 (113)	49 (136)	47 (121)	52 (114)	50 (115)	54 (108)	
Internal—general	58 (146)	62 (133)	66 (122)	61 (134)	62 (157)	69 (117)	67 (141)	
Internal—cardiology	41 (34)	41 (32)	50 (32)	45 (31)	45 (29)	47 (30)	50 (26)	
Internal—other	36 (121)	33 (104)	34 (107)	32 (101)	32 (101)	35 (92)	35 (91)	
Neurology	46 (24)	45 (22)	40 (25)	40 (25)	44 (25)	40 (25)	44 (25)	
Neurosurgery	67 (12)	67 (9)	63 (8)	50 (8)	64 (11)	50 (8)	64 (11)	
OB/GYN	53 (128)	60 (116)	65 (109)	62 (117)	60 (111)	50 (8)	64 (11)	
Ophthalmology	58 (55)	58 (53)	55 (53)	49 (57)	48 (54)	56 (50)	64 (105)	
Orthopedics	55 (69)	64 (77)	65 (83)	67 (94)	74 (99)	71 (89)	53 (49)	
Otolaryngology	51 (43)	66 (41)	65 (43)	55 (47)	58 (48)	58 (45)	78 (93)	
Pathology	54 (85)	49 (80)	45 (76)	42 (77)	43 (79)	44 (73)	60 (42)	
Pediatrics	45 (206)	43 (184)	39 (174)	37 (194)	42 (195)	43 (169)	47 (172)	
Plastic surgery	43 (7)	38 (8)	50 (8)	57 (7)	46 (13)	57 (7)	46 (13)	
Preventive	38 (26)	29 (21)	35 (23)	32 (31)	40 (35)	41 (22)	52 (25)	
Psychiatry	39 (101)	39 (93)	35 (94)	37 (92)	36 (91)	40 (86)	40 (83)	
Radiology	56 (102)	65 (110)	68 (106)	65 (111)	54 (92)	66 (109)	55 (91)	
Thoracic surgery	30 (10)	58 (12)	50 (12)	44 (9)	40 (10)	50 (8)	40 (10)	
Urology	62 (34)	61 (33)	68 (38)	54 (41)	59 (37)	58 (38)	63 (35)	
Other	19 (16)	33 (15)	24 (17)	22 (18)	33 (18)	27 (15)	38 (16)	
Total	52 (1,686)	55 (1,574)	57 (1,613)	53 (1,703)	55 (1,731)	58 (1,558)	59 (1,572)	
Number missing	62	28	38	38	31	30	22	

NOTE: Population size is in parentheses.

a. Experience as a physician is defined as number of years since completion of first residency.
b. Some records for fully trained specialists are missing the first residency completion date. For records that are missing the first residency completion date in a given year, the first valid residency completion date found on the closest subsequent year's record is used as a substitute. Because some records are still missing the residency completion date, the population size differs slightly from those in tables 7 and 10.

Of the 23 specialties analyzed, 13 of the unadjusted figures and 17 of the adjusted figures have experienced an increase in the percentage of newly trained physicians since FY 1983. In specialties that have been relatively stable in size and have had increases in the percentage of new physicians, such as general surgery, new physicians have been replacing those experienced physicians that leave, resulting in fewer experienced personnel on board. In contrast, in growing specialties (e.g., anesthesiology), the increase in the percentage of new physicians reflects the influx of new doctors and not necessarily a reduction of experienced personnel.

The analysis of specialty retention reveals that the degree and nature of the manpower shortage problem varies among the specialties. The evaluation of several retention measures together reveals that certain specialties consistently have low retention rates. Two specialties, anesthesiology and general surgery, were selected as examples of specialties with relatively low and moderate retention rates, and their retention patterns are analyzed in further detail in appendix G.

CONCLUSION

Navy medicine has an acute manpower shortage problem relative to physical capacity and the demand for care. One contributor to this manpower problem is the low retention of physicians. No single retention measure, taken in isolation, reveals the full extent of Navy medicine's retention problem. Examination of a variety of retention measures reveals that the medical corps has a significant and growing retention problem among physicians who have recently completed their initial obligation, certain specialties, and experienced personnel in specific specialties. Furthermore, the recent dramatic decline in the retention rate at the end of initial obligation and the decline in the continuation rate of specialists may indicate a growing retention problem.

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APPENDIX A
COMPARISON OF OMF AND BUMIS

APPENDIX A

COMPARISON OF OMF AND BUMIS

OMF and BUMIS both provide information on physicians. However, BUMIS proved to be the more detailed and reliable source of information. Several variables essential to the analysis of physician retention simply cannot be obtained from the OMF as it currently exists. This appendix documents some of the discrepancies between the two data sets and some specific problems with the OMF as a source of data on Navy physicians.

The OMF and BUMIS give different counts of the number of active duty physicians (table A-1). The magnitude of the difference is greater than the simple difference suggests because some individuals appear on only one of the files. The last two columns of the table show the number of matches, or the number of physicians appearing on both files, and the number of nonmatches.

Table A-1. Number of active duty physicians: OMF vs. BUMIS

Fiscal year	Source of data			Number of matches	Number of nonmatches
	BUMIS	OMF	Difference		
1983	3,847	3,851	4	3,788	122
1984	3,930	3,989	59	3,896	127
1985	3,954	3,986	32	3,928	84
1986	3,947	3,966	19	3,927	59
1987	3,896	3,883	13	3,865	49

The OMF does not contain an adequate record of specialty codes for physicians, particularly before FY 1986. Table A-2 compares the total number of active duty physicians on the OMF with the number who lack a valid specialty code. In several years, the fraction of those without a valid code exceeds one-third. In comparison, the BUMIS data revealed significant variation in physician retention by specialty. This fact could not have been discovered with the OMF data.

The OMF, as currently configured, does not contain fields for information on residency training. BUMIS contains fields for residency begin date, residency completion date, and residency facility for up to three residencies. This information is essential in determining a physician's initial obligation, a key career milestone. A residency completion date is also necessary to measure a physician's experience as a specialist.

Table A-2. Physicians without a specialty code on the OMF

Fiscal year	Total	Number without specialty code	Percentage without specialty code
1980	3,484	362	10.4
1981	3,573	857	24.0
1982	3,612	1,276	35.3
1983	3,851	1,795	46.6
1984	3,989	2,235	56.0
1985	3,986	451	11.3
1986	3,966	79	2.0

BUMIS contains detailed information on obligation status and source of entry. The obligated service date (OSD) allowed CNA to distinguish between obligated and unobligated physicians in the analysis of retention. The source of entry (SOE) codes allowed the retention behavior of USUHS, AFHPSP, and direct accessions to be analyzed separately. Although related information appears on the OMF, the code book indicates that the data are not recorded to the same level of detail. The source code on the OMF only distinguishes physicians from other Navy officers; it does not identify the physician's accession program.

APPENDIX B

RETENTION OF UNOBLIGATED PHYSICIANS

APPENDIX B

RETENTION OF UNOBLIGATED PHYSICIANS

This appendix contains the retention rate of all unobligated physicians by year.

Table B-1. Aggregate retention rates of unobligated physicians^a

FY 1984	FY 1985	FY 1986	FY 1987
76 (1,500)	76 (1,573)	76 (1,583)	74 (1,569)

SOURCE: BUMIS.

NOTE: Population size in parentheses. Excludes individuals with missing obligation status data.

a. Calculated as the percentage of physicians on active duty at the beginning of the fiscal year who were still on active duty at the end of the fiscal year.

APPENDIX C

**CONTINUATION RATES BY YEARS OF SERVICE
AND SOURCE OF ENTRY**

APPENDIX C

CONTINUATION RATES BY YEARS OF SERVICE AND SOURCE OF ENTRY

This appendix gives continuation rates by years of service and source of entry. Although training paths vary significantly among Navy physicians, individuals from the same entry source generally have similar experience levels and service obligations.

Table C-1 gives the continuation rates by years of service for direct accessions. Most direct accessions begin active duty as fully trained specialists with a two-, three-, or four-year initial contract obligation. The data show some decline in the continuation rates between two and four years of service, which implies that the end of initial contract obligation is a retention decision point for direct accessions.¹

Tables C-2 and C-3 give the continuation rates by years of service for scholarship students. For the purposes of calculating continuation rates, deferred AFHPSP students are defined as the scholarship students who complete a residency in the civilian sector prior to becoming active duty. These AFHPSP students entered the Navy fully trained and have a three- or four-year obligation depending on how many years they accepted the scholarship.

Nondeferred scholarship students become active duty directly after completing medical school. Typically, they serve as GMOs for several years before beginning a residency program. Time spent as a GMO counts against their scholarship obligation but time spent in GME training does not. In addition, prior to April 1988, individuals with less than two years of obligation when they entered a residency program were required to serve a minimum of two years following residency completion. If an individual had more than a two-year obligation when he began residency training, his obligation at the end of the residency was the obligation he had at the beginning of the residency. Generally, nondeferred individuals complete their obligation in their seventh to ninth year of service. As shown in tables C-2 and C-3, at the end of obligation, scholarship students have very low continuation rates.

1. Note that interpretation of continuation rates by years of service for direct accessions is complicated by the fact that many volunteers have prior Navy service and thus years of service is not always the same as years since current contract.

Table C-1. Continuation rates by years of commissioned service: direct accessions^a

Years of service ^b	FY 1984	FY 1985	FY 1986	FY 1987	Average rate
<u><1</u>	96 (114)	94 (85)	90 (31)	83 (18) ^c	93
2	81 (95)	86 (111)	71 (73)	82 (28)	80
3	80 (76)	82 (73)	73 (92)	85 (53)	80
4	81 (73)	82 (70)	80 (66)	71 (68)	81
5	86 (85)	85 (60)	74 (58)	71 (56)	79
6	84 (82)	84 (67)	79 (52)	86 (44)	83
7	80 (86)	83 (71)	88 (60)	88 (40)	85
8	85 (80)	81 (72)	83 (59)	85 (55)	84
9	85 (65)	86 (73)	87 (61)	87 (52)	86
10-19	96 (182)	91 (223)	89 (265)	92 (286)	92
20+	75 (40)	61 (39)	68 (31)	79 (29)	71
Total	87 (978)	86 (944)	82 (848)	85 (729)	85
Number missing	17	7	5	9	

SOURCE: BUMIS.

NOTE: Population size is in parentheses. Several records were missing the date of commission in a given year. Records with missing data are generally for new active duty personnel. For the records that are missing the date of commission in a given year, the first valid commissioning date found on the closest subsequent year's record is used as a substitute. There are still, however, a few cases in which an individual is incorrectly counted as inactive or has an incorrect commissioning date. This results in a few appearances of lateral entries into the time-in-service cohorts.

- a. Continuation rates are calculated as the percentage of medical corps officers on active duty at the beginning of the fiscal year year who were still on active duty at the end of the fiscal year.
- b. As of the beginning of the fiscal year. For example, three years of service implies that as of 1 Oct: 2 years of service ≤ 3 .
- c. Continuation rates may be volatile due to small population size.

Table C-2. Continuation rates of Navy medical corps officers by years of commissioned service for deferred AFHPSP students^a

Years of service	FY 1984	FY 1985	FY 1986	FY 1987
1	92 (39)	96 (67)	98 (47)	100 (55)
2	93 (30)	80 (40)	97 (66)	100 (50)
3	88 (26)	53 (30)	56 (39)	65 (65)
4	50 (20)	57 (23)	44 (16)	35 (23)
5	75 (16)	60 (10)	54 (13)	70 (10)
6	100 (6)	92 (12)	63 (8)	86 (7)
7	100 (1)	86 (7)	83 (18)	89 (18)
Total	84 (138)	78 (189)	80 (207)	81 (228)
Number missing	3	0	4	11

SOURCE: BUMIS.

a. Calculated as the percentage of active duty physicians at the beginning of the fiscal year who were still on active duty at the end of the fiscal year.

Table C-3. Continuation rates of Navy medical corps officers by years of commissioned service for nondeferred AFHPSP students^a

Years of service	FY 1984	FY 1985	FY 1986	FY 1987
1	98 (302)	99 (323)	97 (293)	97 (244)
2	98 (317)	96 (306)	99 (326)	99 (289)
3	98 (234)	91 (306)	92 (296)	93 (324)
4	94 (226)	93 (231)	95 (280)	89 (273)
5	94 (220)	92 (213)	91 (217)	89 (266)
6	90 (169)	85 (208)	93 (200)	91 (203)
7	86 (168)	86 (154)	88 (178)	84 (184)
8	65 (95)	74 (145)	76 (134)	72 (159)
9	81 (37)	79 (62)	75 (107)	68 (102)
10-19	93 (30)	86 (59)	85 (102)	81 (166)
Total	93 (1,798)	91 (2,007)	91 (2,133)	89 (2,210)
Number missing	9	9	13	40

SOURCE: BUMIS.

a. Calculated as the percentage of active duty physicians at the beginning of the fiscal year who were still on active duty at the end of the fiscal year.

APPENDIX D
DEFINITION OF INITIAL OBLIGATION

APPENDIX D

DEFINITION OF INITIAL OBLIGATION

BUMIS contains two variables describing a physician's obligation status: obligated service date (OSD) and obligated service code (OSC). The OSD identifies the year and the month in which the officer's most recent obligation ends. The OSC identifies the type of program for which the officer is obligated. The program types include training, training subsidization, augmentation, and initial contract. BUMIS also contains information about other factors, such as GME and source of entry (accession program), that affect the physician's obligated service. BUMIS does not contain information on the years of obligation incurred for the physician's accession program. For example, an AFHPSP participant may be obligated for two, three, or four years. A direct accession may sign a two- or three-year contract. Without this information, the end of an initial obligation cannot be determined precisely for each physician. Instead, bounds must be placed on the length of service past career milestones (such as the end of a residency) that can be considered initial obligated service. Individuals with an OSD falling within those bounds are considered to be at the end of their initial obligation.

INITIAL OBLIGATIONS FOR AFHPSP ACCESSIONS

Scholarship accessions may begin active service as interns, residents, or fully trained specialists. Those who enter as interns or immediately after completing an internship typically spend one or more years as a GMO before beginning a residency. This period of service counts against the initial obligation. However, the physician must serve for at least two years beyond the completion of the residency. The maximum obligation for training under the scholarship program is four years. Together, these bounds mean that a scholarship student with one residency reaches the end of his initial obligation between two and four years after his first residency.

A scholarship accession who completes a second residency remains under the initial obligation as long as the lag between completing the first and beginning the second residency is less than two years. Because a physician must serve at least two years beyond the completion of a residency program, this rule guarantees that the physician is under obligation when the second residency begins. A scholarship student with two or more consecutive residencies reaching the end of an obligation within four years of the end of the last residency is considered to be completing his initial obligation.

INITIAL OBLIGATION FOR DIRECT ACCESSIONS

Direct accessions typically enter the Navy as fully trained physicians. For these individuals, the initial obligation lasts two to three years. A fully trained direct accession reaching the end of an initial obligation within three years of beginning active duty is considered to be at the end of

the initial obligation. Some direct accessions do undertake GME early in their active service. These individuals include accessions who entered the Navy immediately after internship and accessions who completed one residency before beginning active duty. A direct accession who begins a residency program within three years of beginning active duty extends his obligation through this training and is still considered under an initial obligation. Among these individuals, those reaching the end of an obligation within three years of the last consecutive residency are considered to be at the end of their initial obligation.

APPENDIX E
CLASSIFICATION OF SUBSPECIALTIES

APPENDIX E

CLASSIFICATION OF SUBSPECIALTIES

For analytical purposes, board-certified and fully trained specialists are grouped in 23 general specialties. Table E-1 shows the grouping of subspecialties into the 23 categories and an *other* category and lists the BUMIS codes that identify each subspecialty.

The classification of physicians in executive medicine has changed multiple times since FY 1983. A major definitional change occurred in FY 1986 when the subspecialty codes changed. Prior to FY 1986, individuals in executive medicine were classified under a separate subspecialty code and were not included with the clinical specialists. In FY 1986, the subspecialty codes were changed and executive medicine physicians were folded into their respective clinical specialty codes. As a result of this definitional change, disaggregation by subspecialty code creates an inconsistent series over time. For example, a physician in executive medicine who was trained as a surgeon is categorized under executive medicine in FY 1985 and general surgery in FY 1986. Generally, those in executive medicine are senior-level captains and flag officers.

In addition to the code reclassification in FY 1986, there have been several minor adjustments regarding which billets are considered to be executive medicine positions. This is evident by the wide variation in executive medicine inventory levels given in table E-2. As a result, it is extremely difficult to define consistently those physicians in executive medicine with the FY 1983 to FY 1987 BUMIS data. In an attempt to create consistently defined subspecialty categories over time for this analysis, executive medicine personnel were excluded from the subspecialty categories after FY 1986. All individuals who were classified under the executive medicine subspecialty code in FY 1985 are excluded from the clinical specialty classifications in the later years. To exclude individuals who entered executive medicine after FY 1985, a second screen using the billets currently identified as executive medical positions (billet codes 0002, 0004, 0610, 0690, 3283, 3970, 9087, 9420, 9421, 9436, 9942, 9965, 9970, 9992, 0020, and 0048) was used. Although not all physicians in these billets are currently considered to be in executive medicine, the billets approximate the definition of executive medicine that was used before FY 1986. Using this methodology, 153 and 168 physicians were identified as being in executive medicine in FY 1986 and FY 1987, respectively.

Table E-1. Classification of subspecialties

Specialty	Subspecialty	BUMIS specialty codes	
		1983-85 ^a	1986-87 ^b
Family practice	Family practice	1618	1625
	Adolescent medicine	c	1626
	Gerontology	c	1627
Pediatrics	General pediatrics	1613	1630
	Critical care	c	1631
	Oncology	c	1632
	Pediatric cardiology	1615	1633
	Endo/metabolism	c	1634
	Gastroenterology	c	1635
	Hematology	c	1636
	Hem/oncology	c	1637
	Hematopathology	c	1638
	Allergy/immunology	1614	1639
	Immunopathology	c	1640
	Nephrology	1617	1641
	Pediatric neonatology	1616	1642
	Neurology	c	1643
Internal medicine, cardiology	Adolescent medicine	c	1644
	Infectious diseases	c	1645
	Cardiology	1603	1604
Internal medicine, general	General internal medicine	1601	1601
Internal medicine, other	Critical care	c	1602
	Medical oncology	1609	1603
	Endo/metabolism	1604	1605
	Gastroenterology	1605	1606
	Hematology	1606	1607
	Hem/oncology	c	1608
	Hematopathology	c	1609
	Allergy/immunology	1602	1610
	Immunopathology	c	1611

- a. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839D, Vol. I (Major Code Structures).
- b. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839F, Vol. I (Major Code Structures).
- c. An old subspecialty code does not exist.

Table E-1. (Continued)

Specialty	Subspecialty	BUMIS specialty codes	
		1983-85 ^a	1986-87 ^b
Internal medicine, other (continued)	Diagnostic lab immunology	c	1612
	Nephrology	1608	1613
	Pulmonary diseases	1610	1614
	Rheumatology	1611	1615
	Adolescent medicine	c	1616
	Infectious diseases	1607	1617
	Tropical medicine	1612	1618
	Gerontology	c	1619
Pathology	Anatomic/clinical pathology	1629	1585
	Clinical pathology	1630	1586
	Anatomic pathology	1628	1587
	Neuropathology	c	1588
	Dermatopathology	c	1589
	Forensic pathology	1631	1590
	Hematopathology	c	1591
	Radioisotopic pathology	c	1592
	Immunopathology	c	1593
Psychiatry	Psychiatry	1620	1675
	Critical care	c	1676
	Child psychiatry	1621	1677
Radiology	Diagnostic radiology	1636	1650
	Pediatric radiology	1637	1651
	Neurologic radiology	c	1652
	Nuclear radiology	c	1653
	Therapeutic radiology	1625	1655
Obstetrics and gynecology (OB/GYN)	General OB/GYN	1510	1550
	Critical care	c	1551
	Maternal/fetal medicine	1511	1552
	Gynecologic oncology	1512	1553
	Perinatal biology	1513	1554
	Reproductive endocrinology	c	1555
	Gynecologic pathology	c	1556

a. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839D, Vol. I (Major Code Structures).
b. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839F, Vol. I (Major Code Structures).
c. An old subspecialty code does not exist.

Table E-1. (Continued)

Specialty	Subspecialty	BUMIS specialty codes	
		1983-85 ^a	1986-87 ^b
Anesthesiology	Anesthesiology	1622	1540
	Critical care	1591	1541
General surgery	General surgery	1503	1510
	Critical care	c	1511
	Surgical oncology	1505	1512
	Renal transplant surgeon	1509	1513
	Colon-rectal surgeon	1506	1514
	Peripheral vascular surgeon	1508	1515
	Pediatric surgeon	1504	1516
Orthopedic surgery	General orthopedic surgery	1514	1530
	Pediatric orthopedics	1515	1531
	Hand surgery	1507	1532
	Spine surgery	c	1533
Neurological surgery ^d	Neurological surgery	1517	1522
Urology	Urology	1516	1560
	Pediatric urology	c	1561
	Urologic oncology	c	1562
Otolaryngology	Otolaryngology	1524	1565
	Head and neck surgery	c	1566
	Facial plastic and reconstruction	c	1567
	Otology	c	1568
Ophthalmology	Ophthalmology	1520	1570
	Pediatric ophthalmology	1521	1571
	Corneal and external disease	c	1572
	Retinal surgery	1523	1573
	Neuroophthalmology	c	1574
	Ophthalmic pathology	c	1575
	Oculoplastics	c	1576
	Facial plastic and reconstruction	c	1577
	Glaucoma	c	1578

- a. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839D, Vol. I (Major Code Structures).
- b. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839F, Vol. I (Major Code Structures).
- c. An old subspecialty code does not exist.
- d. Population of ten or less.

Table E-1. (Continued)

Specialty	Subspecialty	BUMIS specialty codes	
		1983-85 ^a	1986-87 ^b
Thoracic cardiovascular surgery ^d	Thoracic cardiovascular surgery	1518	1519
	Thoracic surgeon	c	1517
Dermatology	Dermatology	1619	1660
	Dermatopathology	c	1661
	Derm immunology	c	1662
Neurology	General neurology	1623	1670
	Child neurology	c	1671
	Neuropathology	c	1672
Plastic surgery	Plastic surgery	1519	1525
	Facial plastic and reconstruction	c	1526
	Head and neck surgery	c	1527
Aerospace	Aerospace	1632	1683
Emergency	Emergency	1592	1695
Other	Nuclear medicine	1626	1658
	Hyperbaric	c	1688
	Physical rehabilitation	1624	1690

a. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839D, Vol. I (Major Code Structures).
b. From Manual of Navy Officer Manpower and Personnel Classifications, NAVPERS 15839F, Vol. I (Major Code Structures).
c. An old subspecialty code does not exist.
d. Population of ten or less.

Table E-2. Inventory of physicians in executive medicine

Fiscal year	Inventory
1983 ^a	106
1984 ^a	152
1985 ^a	148
1986 ^b	140
1987 ^b	80

SOURCE: FY 1989 Incentive Special Pay Plan, MEDCOM-5125, 19 May 1988.

NOTE: Inventory based on the classification of the time period.

- a. Executive medicine defined by subspecialty code 1500.
- b. Executive medicine defined by billet codes 0002, 0004, 0610, 3283, 9087, 9420, 9421, 9436, 9942, 9965, 9970, 9992, 0020, 0048. Not all individuals in these billets are considered to be in executive medicine under the current category definition.

APPENDIX F
RETENTION OF UNOBLIGATED SPECIALISTS

APPENDIX F

RETENTION OF UNOBLIGATED SPECIALISTS

Unobligated specialists include physicians who are unobligated at the beginning of the fiscal year and physicians who reach the end of an obligation during the fiscal year. The physician's obligation status is determined by the physician's OSD as reported on the BUMIS. The OSD is the date on which the physician's most recent obligation ends. If the OSD falls before or during a given fiscal year, the physician belongs in the unobligated category. The retention rate is calculated as the percentage of unobligated physicians who remain on active duty at the end of the fiscal year. Table F-1 gives the retention rates for unobligated specialists by year and specialty.

Some physicians who become unobligated during the fiscal year may be bound by a pay contract for all or part of the fiscal year. Physicians who accept ASP or ISP must sign a contract agreeing to serve for a one-year period. Most ASP contracts run from July to June, while most ISP contracts coincide with the fiscal year. By accepting ASP or ISP, a physician may be required to remain in the Navy for several months past the OSD reported in BUMIS, which does not reflect any pay contracts. For example, a physician whose training obligation ends in August of FY 1984 may agree to serve through the end of FY 1984 to obtain ISP. If the physician leaves the Navy at the end of the ISP contract, the loss will be counted in FY 1985 rather than FY 1984.

The above example shows how ignoring pay commitments could lead to a low estimate of losses if physicians who become unobligated for training during the fiscal year must remain in the Navy until the expiration of a pay contract. Table F-2 reports separately the retention rates of physicians who begin the year unobligated (and who would only accept ISP if they planned to stay an additional year) and physicians who become unobligated during the fiscal year. The table contains two retention rates for physicians who become unobligated during the fiscal year. The first rate measures retention at the end of the fiscal year in which an obligation ends or within 1 to 12 months of the obligation. The second rate measures retention at the end of the fiscal year following the year in which an obligation ends or within 12 to 24 months of the obligation. The second rate gives physicians a longer observation window in which to leave so that no physician who planned to leave would be bound by a pay contract. Because it is not known how many physicians are bound by a pay contract during the first year after obligation completion (i.e., the 12-month observation window), it is difficult to determine why retention rates fall when the observation window is extended a year. This decline in the retention rate could simply be the result of lengthening the observation period.

Table F-1. Retention rate of fully trained unobligated specialists^a

Specialty					Unadjusted (includes executive medicine)	Adjusted (excludes executive medicine)		
	FY 1984	FY 1985	FY 1986	FY 1987	FY 1987	FY 1987	FY 1987	
Aerospace	95	(21) ^c	100	(15) ^c	82	(17) ^c	92	(26)
Anesthesiology	57	(49)	57	(44)	66	(41)	51	(63)
Dermatology	77	(26)	88	(26)	86	(29)	71	(33)
Emergency	71	(7) ^c	40	(5) ^c	92	(13)	86	(14) ^c
Family practice	73	(134)	66	(105)	72	(107)	74	(125)
General surgery	72	(58)	87	(70)	64	(91)	79	(80)
Internal	77	(200)	76	(181)	73	(172)	73	(178)
Neurology	71	(14) ^c	80	(15) ^c	71	(17) ^c	82	(17) ^c
Neurosurgery	22	(9) ^c	33	(3) ^c	75	(4) ^c	75	(4) ^c
OB/GYN	68	(72)	58	(73)	71	(56)	63	(72)
Ophthalmology	76	(37)	85	(33)	70	(40)	73	(40)
Orthopedics	68	(40)	69	(39)	72	(53)	64	(47)
Otolaryngology	61	(33)	64	(25)	67	(24)	71	(31)
Pathology	86	(56)	84	(57)	69	(59)	83	(58)
Pediatrics	82	(153)	82	(132)	83	(134)	83	(146)
Plastic surgery	50	(4) ^c	100	(4) ^c	100	(3) ^{cd}	67	(3) ^c
Preventive medicine	84	(19) ^c	76	(17)	79	(14) ^c	90	(20)
Psychiatry	80	(75)	81	(69)	80	(71)	85	(75)
Radiology	67	(61)	58	(67)	64	(53)	65	(65)
Thoracicsurgery	50	(6) ^c	80	(5) ^c	50	(6) ^c	100	(6) ^{cd}
Urology	60	(20) ^c	81	(21) ^c	81	(27)	69	(29)
Other	100	(13) ^{cd}	83	(12) ^c	75	(12) ^c	87	(15) ^c
All fully trained	74	(1,107)	74	(1,018)	74	(1,043)	75	(1,147)
							73	(999)

SOURCE: BUMIS.

NOTE: Population size is in parentheses.

- a. Calculated as the percentage of fully trained specialists who were unobligated at the beginning of the fiscal year or were due to become unobligated during the fiscal year who were on active duty at the end of the fiscal year.
- b. Excludes individuals with missing obligation status data. In none of the years examined were there more than a total of 17 records that had missing obligation status data.
- c. Retention rates may be volatile due to small population size.
- d. These rates do not reflect the departure of individuals who were under obligation according to their records or had missing obligation status data.

Table F-2. Retention rate of fully trained unobligated specialists

Fiscal year	Physicians unobligated at beginning of fiscal year	Physician ending an obligation in fiscal year	
		12-month window	24-month window
1984	82	54	43
1985	83	53	36
1986	81	55	41
1987	84	47	N/A

APPENDIX G

**DETAILED MANPOWER ANALYSIS OF
GENERAL SURGERY AND ANESTHESIOLOGY**

APPENDIX G

DETAILED MANPOWER ANALYSIS OF GENERAL SURGERY AND ANESTHESIOLOGY

This appendix contains a detailed analysis of retention patterns in two problem specialties: anesthesiology and general surgery. Specifically, the analysis examines the sources of changes in endstrength and experience levels over time by tracking individuals in each specialty over time. Anesthesiology and general surgery endstrengths were computed for FY 1983 through FY 1987, keeping track of gains, losses, and retained physicians and the year the physician originally was observed as a member of the specialty. This appendix explains the criteria used to construct the samples and compute the retention measures and provides a comparative analysis of the results.

The first sample contains all fully trained anesthesiologists on active duty at some time between FY 1983 and FY 1987. The second sample contains all fully trained general surgeons on active duty at some time between FY 1983 and FY 1987. Each sample of specialists goes through the same tracking procedure to determine endstrengths, gains, losses, and retained physicians.¹

The initial subsamples of specialists contain all fully trained anesthesiologists and general surgeons observed on active duty at the end of FY 1983.² All anesthesiologists and surgeons observed in FY 1983 who become inactive in FY 1984 or remain active but switch specialty status are counted as a loss to total specialty endstrength in FY 1984. Next, all anesthesiologists and surgeons who were not on active duty and fully trained in FY 1983 but are on active duty and fully trained in FY 1984 are counted as a gain to their specialties' endstrength in FY 1984. A gain to specialty endstrength during these years does not necessarily entail being a new accession to the Navy medical force. Most gains are from the training pipeline and were previously on active duty but not fully trained. In addition, a gain in any of these years may be a physician previously observed as a fully trained anesthesiologist (or general surgeon) on active duty who temporarily stopped practicing in that specialty but remained on active duty in training or in another specialty and then returned to his previous specialty. Only doctors who were active duty, fully trained anesthesiologists or surgeons from FY 1983 to FY 1984 are considered retained.

The tracking procedure repeats for FY 1985 to determine how many physicians are gained, lost, or retained in that year. After endstrength, losses, and retained physicians are counted for FY 1985, the process repeats for FY 1986 and FY 1987. The computations for each year rely on the status of each physician at the end of the previous fiscal year. It is important to remember

1. A tracking variable, IN, is used to trace the status of anesthesiologists and general surgeons over the specified five-year period. The value of IN will be set to 1 whenever a physician is observed as a fully trained specialist on active duty at the end of the FY under consideration in the tracking process; otherwise the value of IN will be 0.

2. For these physicians, IN is set to 1.

that the endstrengths represent totals for the specialties under consideration: anesthesiology or general surgery.

Tables G-1 and G-2 show the turnover of fully trained anesthesiologists and general surgeons, respectively, by the original year of entry into the specialty between FY 1983 and FY 1987. By the end of FY 1987, only 26 percent of the anesthesiologists and 34 percent of the general surgeons originally observed in FY 1983 were retained and working in these specialties.

Table G-1. Turnover of fully trained anesthesiologists by original year of entry into the specialty between FY 1983 and FY 1987^a

Fiscal year	specialty endstrength	Cumulative continuation rate by original year of entry into the specialty				
		Total FY 1983 or before	FY 1984	FY 1985	FY 1986 ^c	FY 1987
1983	88	100 (88)	—	—	—	—
1984	84	68 (60)	100 (24)	—	—	—
1985	115	47 (41)	96 (23)	100 (51)	—	—
1986	113	38 (33)	54 (13)	90 (46)	100 (21)	—
1987	117	26 (23) ^b	33 (8)	59 (30)	100 (21)	100 (35)

SOURCE: BUMIS.

NOTE: Cohort size is in parentheses.

- a. A few individuals temporarily lose their specialty privileges. As a result, an individual could have first become a fully trained anesthesiologist in FY 1984, left the specialty for a year, and reentered in FY 1986. In figure G-1, cohort accessions are defined as all active duty anesthesiologists who were not practicing anesthesiologists in the previous year and thus includes individuals who reenter the specialty. The above table categorizes anesthesiologists by their original year of entry into the specialty and therefore the numbers differ slightly from those in figure G-1.
- b. Of the 87 anesthesiologists on board in FY 1983, 24 (or 28 percent) were still in the Navy in FY 1987 as shown in table 8 of the main text. However, 1 of these 24 individuals was no longer a practicing anesthesiologist in FY 1987 and is a loss to the specialty.
- c. Includes any physician who was recoded to anesthesiology from executive medicine when the subspecialty categorizations changed.

Figure G-1 traces the turnover of fully trained anesthesiologists from FY 1983 to FY 1987. During this time, anesthesiologists endstrength increased from 88 in FY 1983 to 117 in FY 1987. This increase in endstrength was due greatly to the large number of gains to the specialty in FY 1985. In the other years, anesthesiologist gains and losses were fairly balanced in number and tended to offset each other. Anesthesiology's previous high loss rate has been offset in recent years by a number of gains to the specialty, primarily through the training pipeline. For example, in FY 1988, the Navy graduated 30 new anesthesiologists.

Table G-2. Turnover of fully trained general surgeons by original year of entry into the specialty between FY 1983 and FY 1987^a

Fiscal year	specialty endstrength	Cumulative continuation rate by original year of entry into the specialty					
		Total		FY 1984	FY 1985	FY 1986 ^c	FY 1987
		FY 1983 or before	FY 1984				
1983	118	100	(88)	—	—	—	—
1984	114	70	(60)	100	(31)	—	—
1985	136	6	(41)	97	(30)	100	(34)
1986	121	39	(33)	55	(17)	88	(30)
1987	114	34	(40)	42	(13)	50	(17)
						81	(21)
						100	(23)

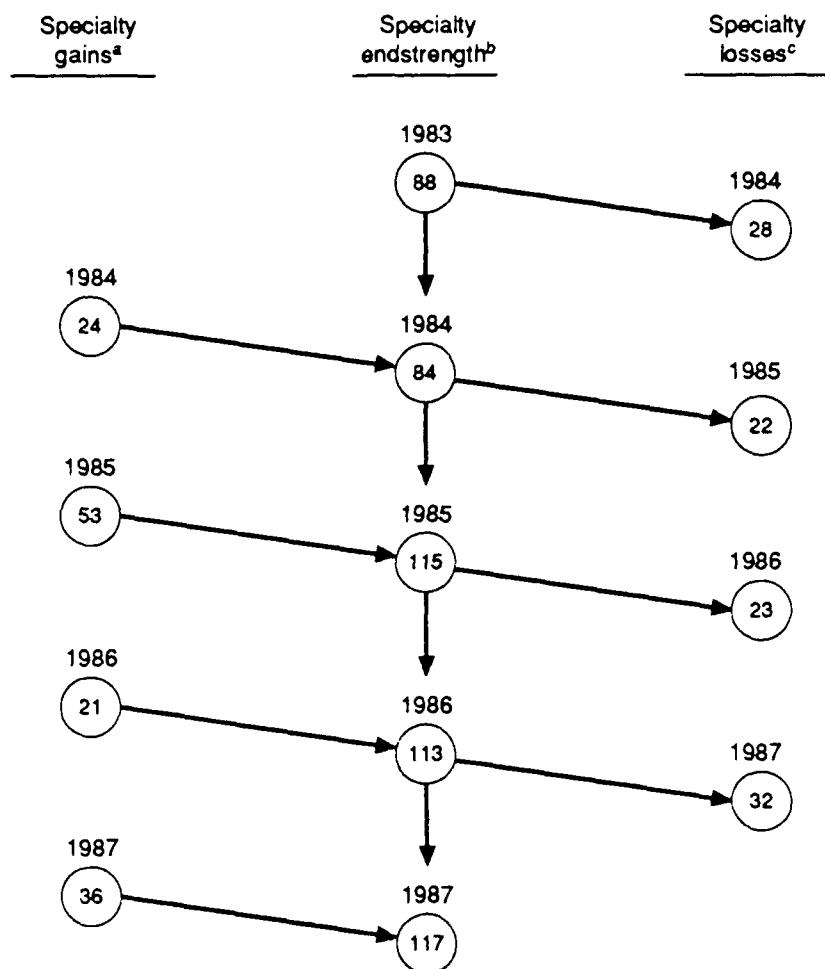
SOURCE: BUMIS.

NOTE: Cohort size is in parentheses.

- a. A few individuals temporarily lose their specialty privileges. As a result, an individual could have first become a fully trained anesthesiologist in FY 1984, left the specialty for a year, and reentered in FY 1986. In figure G-2, cohort accessions are defined as all active duty general surgeons who were not practicing surgeons in the previous year and thus includes individuals who reenter the specialty. The above table categorizes surgeons by their original year of entry into the specialty, and therefore the numbers differ slightly from those in figure G-2.
- b. Includes any physician who was recoded to general surgery from executive medicine when the subspecialty categorizations changed.

Figure G-2 presents the turnover of fully trained general surgeons from FY 1983 to FY 1987. As in the case of anesthesiology, general surgery endstrength experienced the same boost by a large number of gains in FY 1985. However, it has been unable to sustain this higher endstrength level because, in the years since FY 1985, it has suffered a larger number of losses than gains. As a result, the specialty was slightly smaller at the end of FY 1987 than it was at the end of FY 1983.

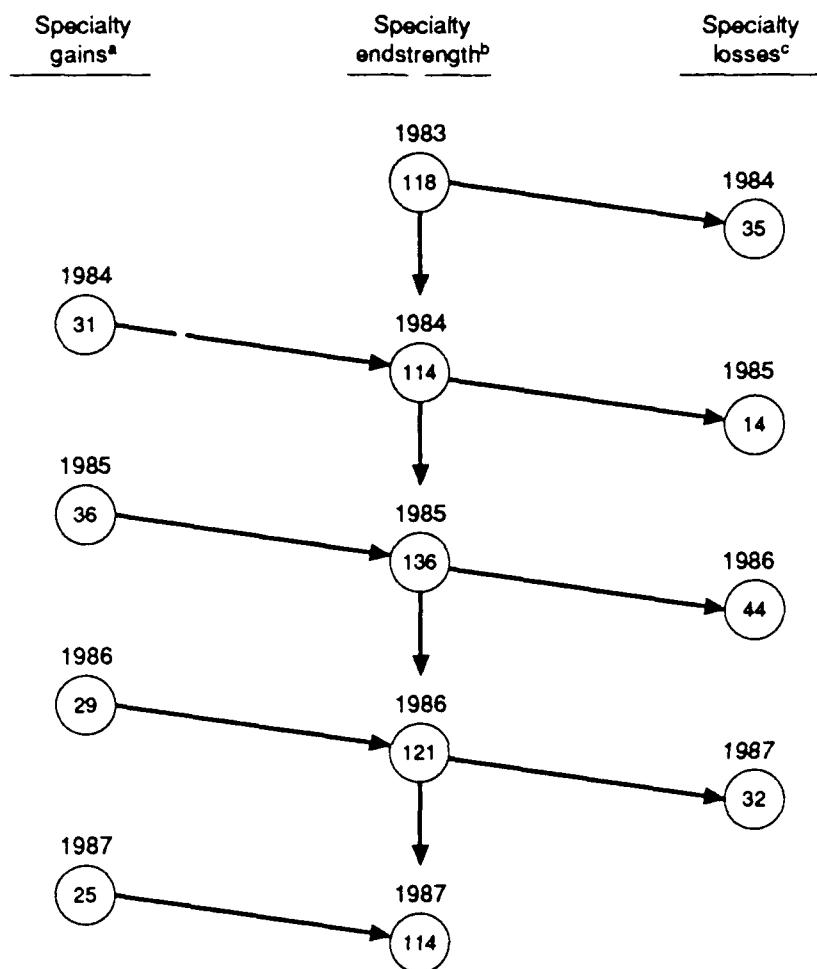
The high turnover in anesthesiology and general surgery between FY 1983 and FY 1987 affected the experience levels in these specialties. Table G-3 shows that as anesthesiology endstrength has increased over time, the number of experienced anesthesiologists has remained fairly steady. Thus, all the growth in the specialty is the result of an increase in the number of inexperienced physicians. Table G-4 shows that general surgery has not experienced a sustained increase in endstrength since FY 1983 and also has not been able to sustain the number of experienced general surgeons with ten or more years of experience. The general surgery cohort is gradually growing younger.



SOURCE: BUMIS.

- Defined as the number of active duty, fully trained anesthesiologists entering the specialty by the end of the fiscal year.
- Defined as the number of active duty, fully trained anesthesiologists working in the specialty as of the end of the fiscal year.
- Defined as the number of active duty, fully trained anesthesiologists who have left the specialty during the fiscal year.

Figure G-1. Turnover of fully trained anesthesiologists between FY 1983 and FY 1987



SOURCE: BUMIS.

- Defined as the number of active duty, fully trained general surgeons entering the specialty by the end of the fiscal year.
- Defined as the number of active duty, fully trained general surgeons working in the specialty as of the end of the fiscal year.
- Defined as the number of active duty, fully trained general surgeons who have left the specialty during the fiscal year.

Figure G-2. Turnover of fully trained general surgeons between FY 1983 and FY 1987

Table G-3. Experience level of fully trained anesthesiologists from FY 1984 to FY 1987

	Years of experience ^a			Mean
	1-3	4-9	10+	
FY 1984				
Specialty cohort accessions ^b	22	2	0	1.5
Specialty cohort losses ^c	11	10	6	7.0
Specialty endstrength	47	20	17	2.0
FY 1985				
Specialty cohort accessions ^d	46	3	2	1.6
Specialty cohort losses	10	8	4	6.0
Specialty endstrength ^e	75	22	16	4.0
FY 1986^f				
Specialty cohort accessions	17	0	4	5.0 ^g
Specialty cohort losses	11	9	2	4.0
Specialty endstrength	74	18	21	5.0
FY 1987				
Specialty cohort accessions	32	3	1	2.0
Specialty cohort losses	20	10	2	4.0
Specialty endstrength	74	23	20	5.0

SOURCE: BUMIS.

- a. Calculated as the number of years since completion of first residency. Several records were missing the first residency completion date in a given year. Records with missing data are generally for new active duty personnel. For the records missing the residency completion date in a given year, the first valid residency completion date found on the closest subsequent year's record is used as a substitute.
- b. Defined as the number of active duty, fully trained anesthesiologists entering the specialty by the end of the fiscal year.
- c. Defined as the number of active duty, fully trained anesthesiologists who have left the specialty during the fiscal year.
- d. Defined as the number of active duty, fully trained anesthesiologists at the end of the fiscal year.
- e. Two records are missing their residency completion data for the FY 1985 cohort and thus are not included in the experience profile table.
- f. Accessions to specialty include individuals who were recoded to anesthesiology from executive medicine under the 1986 coding change.
- g. Skewed by three doctors with 21 years of experience. Excluding these outliers, the adjusted mean equals 2.0.

Table G-4. Experience level of fully trained general surgeons from FY 1984 to FY 1987

	Years of experience ^a			Mean
	1-3	4-9	10+	
FY 1984				
Specialty cohort accessions ^b	22	1	8	5.7
Specialty cohort losses ^c	14 ^d	4	15	10.0
Specialty endstrength ^e	43	20	51	9.0
FY 1985				
Specialty cohort accessions	22 ^f	6	6	4.4
Specialty cohort losses	7	3	4	6.6
Specialty endstrength	52 ^f	29	54	8.8
FY 1986^g				
Specialty cohort accessions	19 ^h	2	6	5.1
Specialty cohort losses	20	10	14	7.9
Specialty endstrength	47 ^h	20	52	8.8
FY 1987				
Specialty cohort accessions	22	2	1	1.9
Specialty cohort losses	13 ⁱ	8	10	7.3
Specialty endstrength	48	21	45	8.5

SOURCE: BUMIS.

- a. Calculated as the number of years since completion of first residency. Several records were missing the first residency completion date in a given year. Records with missing data are generally for new active duty personnel. For the records missing the residency completion date in a given year, the first valid residency completion date found on the closest subsequent year's record was used as a substitute.
- b. Defined as the number of active duty, fully trained general surgeons entering the specialty by the end of the fiscal year.
- c. Defined as the number of active duty, fully trained general surgeons who have left the specialty during the fiscal year.
- d. Two records are missing residency completion dates in FY 1983.
- e. Defined as the number of active duty, fully trained general surgeons at the end of the fiscal year.
- f. One record is missing its residency completion date in FY 1985.
- g. Accessions to the specialty include individuals who were recoded to general surgery from executive medicine under the 1986 coding change.
- h. Two records are missing residency completion dates in FY 1986.
- i. One record is missing its residency completion date in FY 1987.